The Magazine of the Registered Professional Engineer

American Engineer

FEBRUARY 1960

ANNUAL ENGINEERS' WEEK ISSUE

Engineering's Great Challenge— The 1960's

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Want to be an Executive?

Management is actively looking for engineers who have the desire and ability to become administrators

by
James M. Jenks

In a sense, this is the golden age for engineers. Once buried in corporate obscurity, many of them have emerged today as likely heirs apparent to the big jobs — and the big rewards — of business and industry. One impressive indication of this growth is that money spent in research and development over the past fifteen years has increased six-fold.

Despite this stepped-up activity, however, the once disorganized scramble for engineers seems to have ended . . . at least temporarily. And perhaps it's a good thing. Actually, the more perceptive engineers had always realized that unusually high starting salaries were often illusory. The gap between money being offered beginners and the incomes of experienced men was narrowing rapidly. Further, more and more thinking technical men concluded that even top engineering salaries are low when compared with the remuneration of highly placed general executives.

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Actually, it comes down to this: To succeed as a business executive, the engineer must learn the art of making decisions quickly and accurately. And this ability is, of course, directly dependent upon knowledge. The "principles" of business—while not as scientific and inexorable as those of engineering—are no less important . . . no less essential to efficient procedure.

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FEBRUARY 1960
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Professional News and Features

General News 9
Consulting 11
Education 16
Government 18
Industry 19
Society News 49

Special Engineers' Week Messages from President Eisenhower and NSPE President Mosher ..... 8 and 29
Engineering's Great Challenge—The 1960's 21
By John T. Kane
How Recessions Affect Engineers 30
By Joseph C. Lewis
Professions in Michigan Organize to Provide Mutual Advancement 36
By Nathaniel O. Saulter, P.E.
A Listing of the State Boards 38
The Meaning of Your Profession 39
By Vice Admiral H. G. Rickover
Member State Societies' Officers and Directors 48

The Engineer at Work

Caltech Builds Earthquake Machine 43

Regular Departments

Letters 6
Meetings of Note 6
This Month 13
From Washington 27
Professional Profiles 35
New Literature 44
Strictly Business 47
Thoughts on Professionalism ... 50
With the Auxiliaries 52
Dates to Remember 53
Classified 55
Professional Directory 61
Advertisers' Index 66
Progress in Products 68

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Letters to the Editor

"Quo Vadis" . . .

Dear Editor:

May I compliment Mr. Robbins on his article "Quo Vadis" in the December issue of the AMERICAN ENGINEER.

About 400 years ago, Sir Francis Bacon wrote as follows:

"I hold every man a debtor to his profession; from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto." I am a strong believer in that policy and have added to that a duty to my country and community.

Tho past seventy-eight, I have taken on a lot of duties younger men fail to do. I have tried to attend meetings regularly and work on committees. . . .

LEO DOLKART, P.E.
Chicago, Ill.

NSPE and Education . . .

Dear Editor:

I have some doubt in my mind that we (NSPE) are handling the matter of news on Russia's large number of engineers to the best advantage of the American economy. The NSPE's point of view might be construed by some as indicating that we should cut down on the number of people taking engineering rather than increase those numbers, and that in general no one but top quality people should attempt the high calling of engineering. Somehow this seems to "smack" more of a union's point of view—that is, keep the numbers down so that we can keep the demand high.

I think we are missing an opportunity in that as the world grows more technical, everyone should have more appreciation of technical matters, particularly as they apply to those engineering facts of life which surround us on every side. I would ask the question, "If people interested in engineering don't take engineering, what else would they take that's better?" I agree completely that the best ones should be sought out and pushed to ever higher heights, but I cannot quite agree that all those not capable of the highest heights should be encouraged to do other things. I think the engineering profession is like a pyramid—we need a strong base.

The NSPE position also "smacks" of the propaganda technique of either/or: that is, either we have quality, or we have numbers. Does this have to be so? Wouldn't it be better to take a positive view rather than a negative one and say that NSPE is out to (1) identify all of the top people suitable for engineering that it can; (2) push them to the highest heights possible, and (3) hope to inject engineering knowledge into as large a segment of the population as possible? And, I might add that what is going on in Russia may well be used in a positive manner to supply some impetus to this program.

JOHN GAMMELL, P.E., Director of Graduate Training
Chairman, ECPD Committee on Development of Young Engineers, and 1st Vice President, Wisconsin Society of Professional Engineers,
Milwaukee, Wis.

Plaudits for AE . . .

Dear Editor:

The AMERICAN ENGINEER gets better and more interesting every month.

PETER WEISSENBERG, E.I.T.
Drexel Hill, Pa.

Reminds Reader . . .

Dear Editor:

Mr. Monsees' able discussion of "The Anatomy of Executive Leadership" in the December issue reminds me of the managerial creed of Gerard Swope, former president of General Electric. He used to tell us that the executive's job is to analyze, organize, deputize, and supervise.

ROBERT W. ADAMS, P.E.
Waban, Mass.

Engineer Titles . . .

Dear Editor:

In the December, 1959, issue of AMERICAN ENGINEER you printed a letter signed by T. Finnegan, P.E., of Buffalo, N. Y. Mr. Finnegan asks a very reasonable question regarding the wording of our new policy in which we have restricted the use of the title "Engineer."

We wish to reassure Mr. Finnegan as well as all of your readers that this was in fact an error in wording and not an error in policy. In our Research and Development Department and in our Quality Control Department we employ chemists, chemical engineers, ceramists, and ceramic engineers. All of these individuals are graduates with at least bachelor of science degrees in their respective fields. In the past it has been our policy, like a large segment of American industry to call all of these people research engineers or quality control engineers. We recognize the need for revision and thus revised our policy to restrict the title of "Engineer" to those individuals who are registered professional engineers. Naturally, some of our chemists have no desire to become registered professional engineers and others would not be qualified for this registration. Consequently we have given these individuals the option of selecting the title which most closely defines their professional status.

This same policy holds true for the other branches of engineering within our company and we concur with Mr. Finnegan in that professional titles should not be applied to nonprofessional employees.

I wish to thank Mr. Finnegan for calling this to our attention and I hope this explanation makes our intent clear.

H. NATHAN STONE,
Director of Research and Development,
Bay State Abrasive Products Co.
Westboro, Mass.

Solution . . .

Dear Editor:

I read with considerable interest the article entitled "Misuse of Talent

(Continued on page 51)

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(Circle 1 in Readers' Service Dept.)

Meetings of Note

American Society of Heating and Air-Conditioning Engineers—Semi-Annual Meeting, February 1-4, Dallas, Texas.

American Society for Testing Materials—Committee Week, February 1-5, Sherman Hotel, Chicago, Illinois.

American Institute of Mining, Metallurgical, and Petroleum Engineers—Annual Meeting, February 14-18, Hotels Statler-Hilton and Sheraton-Atlantic Hotels, New York, New York.

American Institute of Chemical Engineers—Winter Meeting, February 21-24, Biltmore Hotel, Atlanta, Georgia.

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In North Dakota it was found that by comparing amortized first costs plus surface maintenance costs for concrete and asphalt, *concrete will save $72,200 per mile in 35 years.*

Estimates were based on maintenance costs shown in an official study of pavements in 28 reporting states. And because the asphalt design being considered would require two resurfacings, this cost was figured in, too. Bureau of Public Roads life expectancy studies gave the schedule for such resurfacings. Final figures evidenced impressively the sizable year-after-year savings provided by concrete!

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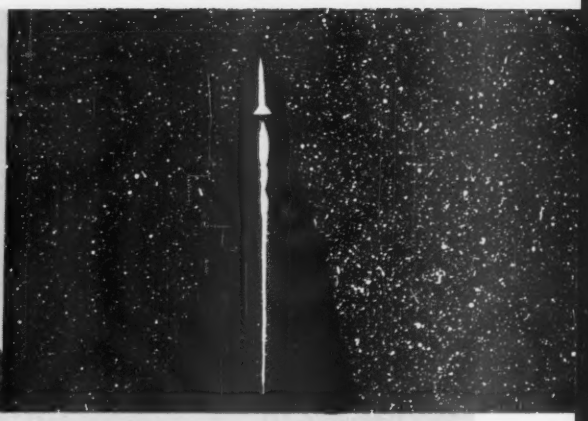
Concrete highways 35 years old are a matter of record. Today's modern concrete promises 50 years and more of smooth going for drivers. Thrifty concrete on the Interstate System leaves more funds for other highways. Concrete means true economy for taxpayers, both today and in the future. It's easy to see why concrete is the preferred pavement for important highways.

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete

Letter from the President



Dr. George B. Kistiakowsky, left, newly appointed special assistant to the President for science and technology, accepts the Chief Executive's congratulations at the White House.

THE WHITE HOUSE
WASHINGTON

NATIONAL ENGINEERS' WEEK

On the occasion of National Engineers' Week, it is fitting to salute the contributions made by the engineering profession to America's technological development.

The theme for this week, "Engineering's Great Challenge--The 1960's", points to the demands of the coming decade. The unprecedented requirements for excellence, for high performance, and for public service must be met if we are to continue to grow in scientific achievement. In encouraging our young people to prepare for careers in science and engineering, we strengthen the base for further advances.

Dwight D. Eisenhower

Harold A. Mosher, P. E., President
National Society of Professional Engineers
2029 K Street, N. W.
Washington 6, D. C.

National Engineers' Week to Be Observed, February 21-27

- Tenth Annual Event Sponsored by NSPE
- Many Projects by Chapters and States

The tenth annual observance of National Engineers' Week will be held throughout the country during the week of February 21-27.

The 1960 program will be the tenth consecutive observance under the general sponsorship of the National Society of Professional Engineers. Local chapter and state society projects will include career conferences for high school seniors, guided tours of industrial firms and research facilities, the awarding of scholarships, radio and TV programs, exhibits, and talks by professional engineers.

The theme for the 1960 Week is "Engineering's Great Challenge—The 1960's." Promotional material distributed by NSPE at the national level emphasizes the contributions which engineering will make through the coming decade.

National Chairman for the 1960 observance is Belton Y. Cooper, of Birmingham, Alabama, a design engineer for U.S. Pipe & Foundry Company. Thirteen leading engineering figures are acting as individual sponsors for the Week.

All state society and local Engineers' Week committee chairmen are reminded that complete reports on their chapter activities should be sent to the National Society office as soon as possible. These reports are reviewed by the National Engineers' Week Committee as a source of ideas for the next year's program.

Employment Rises for Engineers in Industry

Employment of engineers in private industry increased about four per cent in 1958 according to a recent Bureau of Labor Statistics survey for the National Science Foundation. The number rose from about 605,000 in January, 1958, to 630,000 in January, 1959.

The total number of scientists and engineers in private industry amounted to 780,000 in January, 1959, with 35 per cent engaging in research and development activities.

The Bureau estimates that the 780,000 figure represents two-thirds of the total scientists and engineers employed in the United States, with another 390,000 in government agencies, educational institutions, nonprofit organizations, and self-employed.

The largest numbers of scientists and engineers were employed in the aircraft and parts industry, electrical equipment, and chemicals and allied products. These three industries employed one-third of the scientists and engineers in private industry, or more than 75,000 each, and accounted for one-half of those engaged in research and development. Employing over 50,000 each were the machinery industry (except electrical), and engineering and architectural services. Next in line came construction, fabricated metal products and ordnance, primary metals, and motor vehicles and equipment. Each employed more than 30,000 scientists and engineers.

Water Problems Feature ASCE Meeting in March

Civil engineering problems about water, its control and drainage, feature the national convention program of the American Society of Civil Engineers to be held at New Orleans, La., March 7-11.

More than 1500 engineers from all parts of the country are expected at the winter meeting, which will have twenty-eight technical sessions during the five-day convention. More than 100 papers and speeches have been scheduled.

Also expected at the meeting are more than 200 civil engineering students of colleges and universities in the area, for whom a special program has been arranged.

Technical Education Book Now Available

The Technical Institute in America by G. Ross Henninger, P.E., has recently been released, according to an announcement from the McGraw-Hill Book Company.

The 277-page book summarizes and consolidates a wealth of information developed through the 1956-58 National Survey of Technical Institute Education, conducted by the American Society for Engineering Education under a grant from the Carnegie Corporation and directed entirely by the author. Mr. Henninger is president of the Ohio College of Applied Science and Ohio Mechanics Institute.

The new book—priced at $6—is available from McGraw-Hill at 330 West 42nd Street, New York 36, N.Y.

P.E.'s Needed for Corps Work, Subcommittee Told

The Honorable Dewey Short, Assistant Secretary of the Army for Manpower, Personnel and Reserve Forces, recently told a House Civil

Service Subcommittee that almost all major missions of the Corps of Engineers are highly technical and many require professional engineers for their performance.

During fiscal year 1959, he said, the Corps had in its continental U. S. workforce 8,641 professional engineers. By June of 1959, this number increased to 8,956, an increase of 315. Since almost all engineering positions are GS-11 and above, he continued, this increase in the Corps of Engineers professional force contributed substantially to the total Army increase in these levels.

IRS Proposes New Tax Regulations

For purposes of tax exemption, the Internal Revenue Service has recently proposed regulations defining "scientific research" by nonprofit organizations.

To be classified as "scientific," according to the IRS, research must meet the following criteria:

Must further a "scientific" purpose. An organization which carries on research in furtherance of an educational purpose is not a "scientific" organization although it may qualify for the exemption as an "educational" organization.

Must serve the public interest. Research will be regarded as serving the public rather than a private interest if results are made "freely available to the general public." "Freely available" is defined as ". . . available to the interested public in a practicable manner and on a non-discriminatory basis." Research done for governmental agencies is considered as being freely available to the public, even though the agency involved may restrict the information for national security or other reasons.

Results must be published in entirety. Thus, an organization is not "scientific" if it performs research but only makes available to the public that portion of the results supporting a particular position or viewpoint.

Utilization Conference Scheduled Feb. 19-20

The third annual Conference on the Effective Utilization of Engineering Personnel will be held February 19-20 at Michigan State University, East Lansing, Michigan.

Sponsored by the Michigan Society of Professional Engineers in cooperation with the College of Engineering and Continuing Education Service at MSU, the conference will bring together experts in the various engineering fields to discuss the effective use of engineers and engineering technicians.

Many Engineering Posts Open, Survey Reveals

More than 26 per cent of small-to-medium companies will need engineers to fill administrative vacancies before May, according to a survey sponsored by the Executive Manpower Corporation of New York.

The average sales volume of the firms surveyed was $9 million, with forty-two of the 157 respondents saying they needed more engineering administrators. Almost all of the positions fall in the $10,000 to $20,000 salary bracket and over half will be filled with outside personnel. Most of the companies indicated expansion plans by saying the jobs would be newly created positions.

The comment section of the questionnaire showed little optimism on the part of the companies: "Ours is a technical business making it desirable to have executives with proper engineering background coupled with administrative talent and this is difficult to find."

'Books for Asian Students' Needed

The Asia Foundation is once again asking for publications in its educational program, "Books for Asian Students."

A nonprofit organization, the Foundation has sent more than a million books and a quarter of a million journals to thousands of recipients in Asia.

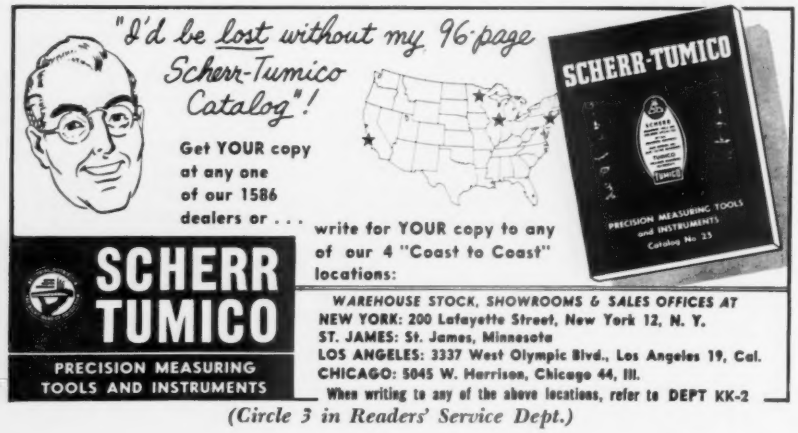
Publications are needed in every category on the university and college level in good condition and published after 1945. They should be sent to: "Books for Asian Students," 21 Drumm Street, San Francisco 11, Calif.

Chem. Engineers to Meet in Atlanta

Seventy-one technical papers on a wide variety of subjects will be presented during the four-day forty-second national meeting of the American Institute of Chemical Engineers at Atlanta, Ga., February 21-24.

A feature of the meeting will be a banquet address by Dr. E. C. Harrison, president of Georgia Institute of Technology. J. W. Mason of Georgia Tech is the general chairman.

Technical sessions will be on nuclear feed materials processing, high temperature pressure technology, the textile industry, mass transfer applications in waste treatment, filtration, mineral engineering, missiles and rockets, engineering education, petroleum solvents, management, pesticides and kinetics.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GAO Report Criticizes Use of Consultants

- Federal Highway Program Involved
- Profit of Firms Held Objectionable

Comptroller General Joseph Campbell has renewed his criticism of the use of consulting engineers by state highway departments in connection with the interstate highway program. In the latest report to Congress on the highway program, the General Accounting Office comes out flatly against the use of private practitioners except for specialized services.

Although the report only reviews the highway situation in Maryland, Pennsylvania, and West Virginia, expressions in the section on inadequate staffing of state highway department organizations would appear to apply equally to all states. The three states named have used private engineering firms extensively "to perform usual types of preliminary highway engineering work," the report notes, criticizing the practice as resulting in additional cost to the states and the Federal Government "by reason of the overhead and profit included in the fees normally charged by such firms."

According to the GAO, "if all required engineering services were performed by the respective state highway departments, there would be no element of profit in highway engineering costs, and, by regulation, state highway department overhead is not a highway cost eligible for Federal participation."

Consideration should be given by the Bureau of Public Roads to limiting Federal participation in consultant contracts, "for services that should be customarily performed by the state highway departments, to the direct costs of such contracts," according to the GAO. They reject the BPR's defense that it was necessary to use consultants to get the highway program off the ground because such practice made available experts not otherwise obtainable. "It is our view," the GAO responds, "that the extensive use by some states of outside consulting engineers for the usual type of engineering work, which in other states is done by state-employed engineers, substantially and unnecessarily increases engineering costs and results in an avoidable inequity among the states in Federal participation in these costs."

Bureau of Public Roads officials told the GAO that the use of consultants was due to the inability of the states to compete with private firms on salaries paid to engineering personnel, the general shortage of engineering personnel and the lack of job security in certain state highway departments arising from the patronage system of personnel selection.

The GAO attitude is apparently influenced by the fact that no part of the cost of maintaining the central office of a state highway department may be paid with Federal funds. The regulations provide further, that consulting engineers may be utilized for design, preparation of plans, specifications, and estimates, and in special cases for construction other than general supervision when:

(1) The work is of unusual character requiring highly specialized knowledge and experience,

(2) It would not be possible to enlarge the staff so as to perform the engineering services within a reasonable time, and

(3) The state has a program substantially larger than normal or expected in future years and it desires to employ consulting engineers rather than build up its organization for a comparatively short period.

The BPR told GAO, according to the report, that it will continue to work through its field offices to encourage the state departments to build up their own forces for accomplishing as much of their own design

(Continued on page 14)

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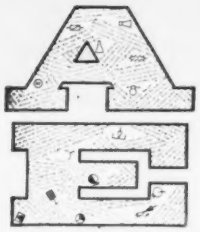

"This Month"

This is our National Engineers' Week issue in furtherance of a ten-year-old observance intended to tell the general public about engineers and their work. For engineers themselves it is an opportune time to look ahead; to take a reading on what is to come. To make it easy for you to analyze the 1960's, the AE has attempted a review of the outpouring of creative engineering which is expected to take place in the next ten years. Entitled "Engineering's Great Challenge-the 1960's," the article touches all the bases from automation to cryogenics. Page 21.

In another staff report (page 30) we study recessions and how they affect engineers. Are engineers still "among the first to go" when the going gets rough? Read what leading executives, engineers, and government officials told the AE about this haunting problem.

A most unique organization exists in Michigan and the story on page 36 tells about it. It is the Michigan Association of Professions and within its framework engineers, doctors, dentists, and architects exchange ideas and discuss their problems.

And on page 39, Part II of the popular article by Vice Admiral H. G. Rickover, "The Meaning of Your Profession." The series began in the January issue.

Two short pieces of interest: An "Engineer At Work" story on page 43 relates the efforts of Caltech engineers in building an earthquake machine, and on page 46 several engineer-architect dispute cases are reviewed.

Checking "This Month's" news:

General. The big news in February is always National Engineers' Week and the story is on page 9. In other headlines: Employment Rises for Engineers in Industry...IRS Proposes New Tax Regulations...Many Engineering Posts Open, Survey Reveals.

Consulting. This important story (page 11) is a study of a new Government Accounting Office report which has keen significance for consulting engineers. In it the powerful GAO criticizes the use of consultants by the government, with major attention being given to their use on the Federal Highway Program. Profits of these firms are also held "objectionable."

Education. Page 16. In the lead story Dr. Gordon S. Brown, dean of engineering of MIT, is reported as saying that college engineering curricula are undergoing a revolution. In another story: Cornell's program for saving students who would otherwise academically flounder is discussed.

Government. The stories: A ruling by the Internal Revenue Service says that government employees cannot deduct nonreimbursed expenses for attendance at professional meetings, unless such attendance was directly related to the "taxpayer's own business or professional interests." Page 18.

Industry. Following a policy re-examination, the NLRB has announced it will adhere to its long-time rule on voting for technical employees. Page 19. And a further story covers a piece in Industrial Relations News which claims that "competent" engineers are in short supply.

And that's "This Month" for "This Month."

Kenneth E. Trombley

Editor

CONSULTING

(Continued from page 11)

work as is practicable with state forces. "However, highway organizations are not implemented overnight," the GAO comments, "and such a revision of organization takes time and sometimes changes of attitude within the state legislatures." The GAO concludes that the Bureau of Public Roads should seek "reasonable enforcement of the law and regulations . . . (recognizing) that it is imperative that the progress of the Federal-aid highway program should not be impeded. We believe, however, that the apparent lack of compatibility of existing legislation with the widespread use of consultant engineering should not be ignored."

Finally, the GAO report is critical of the lack of sufficient qualified engineering personnel for construction inspection, noting that in West Virginia only about ten per cent of the State's project engineers and very few of the construction inspectors are registered or graduate engineers. The GAO recommends that the BPR keep after the states on this account, recognizing the BPR comment that stringent requirements "would be met with opposition from the states as constituting too much Federal interference in state affairs."

The full report was submitted to the House of Representatives and the Senate, with copies to the President, the Secretary of Commerce and the Federal Highway Administrator.

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Kansans Report Progress

At a well-attended meeting of consulting engineers sponsored by the Consulting Engineers' Section of the Kansas Engineering Society, notable progress was reported in the growth of the Section and its services to State and local officials, as well as to the profession.

Secretary-Manager Donald P. Schnacke said the group had grown to fifty-two firms, and there has been a major emphasis on public relations. Some 3,000 directories and 5,000 manuals of practice have been distributed throughout the State.

Several cases of unauthorized practice of engineering have been handled along with general work to bring about a consciousness of the code of ethics. Progress was reported in working with the architects of the state regarding division of fees.

The Kansas Section is sponsoring a breakfast on the morning of February 20, for visiting consulting engineers attending the NSPE meeting in Wichita. E. E. Hysom is chairman of the special committee for this function.

The 10-minute color film on the Keogh-Simpson self-employed retirement bill was shown to the group, followed by a series of talks on Client-Engineer Relations. Among the speakers were Harley E. Lucas, city manager, Hays, Kansas, who discussed "Client Relationship;" Frank Virr, assistant state highway engineer, "Upbringing and Improving Relations With Clients;" Paul D. Newcomer, immediate past president, Kansas County Engineers Association, who spoke on the same subject; Neil Pettit, president-elect, Kansas Chapter American Institute of Architects, who reviewed client relationships from the architects' angle, and Merlin M. Douglas, president, Kansas Builders' Chapter AGC.

Bidding Booklets Released

Two new publications by the Associated General Contractors are of potential interest to consulting engineers—*A Suggested Guide to Bidding Procedure on Building Construction,* and *A Recommended Guide to Bidding Procedure on Engineering Construction.* The latter was prepared jointly with the American Society of Civil Engineers.

The booklet on engineering construction covers preliminary investigation, plans, specifications, bidding, separate contracts and subcontracts. Both booklets are available by writing AGC, 20th & E Sts., N. W., Washington 6, D. C.

New Tax Rate in 1960

In estimating 1960 costs, consultants shouldn't overlook the rate increases for 1960. For the self-employed the new rate is 4½ per cent of self-employment income on the first $4,800.

Those practicing as employees of a corporation will be taxed three per cent directly, with a matching three per cent by the employer, also on the first $4,800 of covered income.

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Engineering Curricula Being Revolutionized—MIT Dean

The nation's college engineering curricula are undergoing a revolution, a noted educator told the winter general meeting of the American Institute of Electrical Engineers.

Faced with a "turbulent technological scene," engineering colleges "are adjusting to the challenge by presenting students a more integrated body of fundamental knowledge, at the sacrifice of the specialized knowledge characteristic of the past," Dr. Gordon S. Brown, dean of engineering, Massachusetts Institute of Technology, reported at a session on education.

As a result, he said, many graduates of a modern four-year curriculum are capable of a career in any one of several industries. Industry, however, particularly the power industry, is less likely to find among four-year graduates the ready-made specialists it may need.

The answers to the needs of specialization, he indicated, lie in more postgraduate work at universities, the offering of training courses by industry, and the affording of opportunities for engineers to obtain refresher instruction "in an organized manner every five years or so."

Cornell Univ. 'Rescues' Floundering Students

About seventy per cent of the students who ordinarily would flounder on academic rocks and shoals are being rescued at Cornell University, it has been revealed by Prof. Blanchard L. Rideout, head of the University's Division of Unclassified Students. And engineering students lead the list!

Professor Rideout said that 646 students have been permitted to enter the unclassified division in its fifteen semesters (7½ years) of operation. Started as an experiment in the spring of 1952 under his direction, it has become a fixture in the university's academic structure because it has been eliminating a tremendous loss in money, time and morale to the University, students' parents and the students themselves.

Other schools on the Cornell campus admitted 387 students, or sixty per cent of all those permitted to enter the Division of Unclassified Students, and ten per cent were admitted to other universities and colleges. DUS dropped 119, or eighteen per cent, and another forty-two, or seven per cent, were refused admission to other schools at the university. A total of ninety-eight students, or fifteen per cent, withdrew to attend other schools, enter service, take a job or a leave of absence.

Completely tabulated statistics kept by Professor Rideout's office show that more students abandon engineering than any other division of the university. Of the ninety-one students registered in the unclassified division in the current term, sixty-seven have given up the study of engineering.

According to Professor Rideout, too many students enter engineering because some high school guidance counselors do not really know their students, and often do not know what basic preparation engineering involves. And what it involves, he said, is highly specialized interest and preparation, as well as ability and intelligence.

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Case Breaks Tradition; Welcomes Women Students

Breaking a tradition of eighty years, Case Institute of Technology for the first time in its history will encourage outstanding women to enroll as undergraduate students at Case.

"We are making this announcement in response to a demonstrated national need," Dr. John A. Hrones, vice president for academic affairs said in explaining the change in Case policy. "The need for college graduates in engineering science and management is growing ever greater.

"We cannot turn our backs upon the great reservoir of potential talent that is available in bright young women graduates from high schools. It is a great pleasure for us to give them an opportunity to embark in these professional fields. For the foreseeable future America will need the educated talents of all its citizens."

David Owen, director of admissions at Case, in commenting on the significant change in policy said, "In traveling throughout the country discussing higher education with students who are interested in science, engineering and management, I have been frequently impressed by the number of highly qualified women who hoped for careers in these fields. Case is performing a genuine service in enlarging its student body to include those women with outstanding records in high school."

NSF to Provide Funds For Summer Institutes

Financial aid will be available in 1960 for about 18,000 high school and college teachers of science, mathematics, and engineering to participate in summer institutes sponsored by the National Science Foundation. Three hundred and seventy-nine institutes will be supported by the Foundation next summer, in 265 educational institutions.

Awards of grants totaling more than $21,000,000 for the Summer Institutes have been announced by Alan T. Waterman, director of the National Science Foundation. Institutes will be held in all fifty states, the District of Columbia, and Puerto Rico. Three hundred and sixteen of the institutes will be open to high school teachers only, thirty-seven will be for college teachers only, and twenty-four will be for both high school and college teachers, and two will be for technical institute personnel.

Roughly 16,000 high school teachers and 2,000 college teachers will be enabled to participate through stipends provided by the NSF.

10,000 Research Projects Underway, Says ASEE

Over 10,000 research projects are now underway in 118 leading engineering colleges across the nation, according to the biennial review published by the Engineering College Research Council of the American Society for Engineering Education.

Expenditures on these research activities during the current year will total over $112,000,000, according to the figures.

Teachers List Job Dissatisfactions

Money is the biggest reason engineering teachers leave colleges for industrial positions but it isn't the only one.

So says a report on faculty loss to industry published in the *Journal of Engineering Education*, official publication of the American Society for Engineering Education. The report was prepared under the direction of A. R. Hellwarth, assistant dean of The University of Michigan College of Engineering.

Other reasons why engineering teachers leave to work in industry include dissatisfaction with teaching loads, administrative details, and relations with college and administration, the report says.

Educational work loads compared to those in industry, seemed of little concern to the 235 former teachers from 77 colleges who were queried for the report. The deciding factor in their moves was income and fringe benefits, 116 said.

Annual salaries of these 235 averaged $5,800 in teaching, or $7,650 when extra income (such as for summer jobs and consulting) was included. During their first year in industry, the former engineering teachers' salaries averaged $9,800, they reported.

Concerning fringe benefits, they indicated that while industry provides better retirement, insurance, and travel allowances, education offers more favorable vacation. A few did not consider fringe benefits of importance, and one said: "I believe that my own best security rests in me and my abilities." Most (198) agreed industry provides better salary advancement.

Asked to name two advantages in industrial employment, thirty-seven per cent cited "salary and money factors" while fifty per cent mentioned "work or working conditions."

What, on the other hand, are the advantages of teaching?

"Satisfaction of teaching and the feeling that one is doing something of value to the society he serves," were mentioned as two top advantages. Also ranking high were "academic freedoms and time freedoms as well as the environment of the campus."

Many evidently retain a desire to teach. Although most (211) said they would repeat the decision to leave teaching for industry, 195 said they hoped eventually to return to the campus, either after gaining considerable practical experience or, "when I can afford to return," the report said.

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Internal Revenue Rules on Deductibility of Expenses

A recent ruling issued by the Internal Revenue Service has held that nonreimbursed expenses incurred in attending a convention, or professional society meeting can only be deducted if attendance is directly related to the taxpayer's own business or professional interests.

If he attends as an appointed or elected delegate he does not, merely because of that status, become entitled to deduct his expenses incurred in connection with his attendance at the meeting. The allowance of deductions for convention or meeting expenses will depend upon whether the relationship between the taxpayer's trade or business and his attendance at the convention is such that by his attendance he is benefiting or advancing the interests of his trade or business, IRS indicated.

One method of determining whether such a relationship exists is to compare the individual's duties and responsibilities of his own position with the purpose of the meeting as shown by the program or agenda. IRS is saying in effect that associations and professional societies must arrange programs directly connected with the taxpayer's job in order to enable those in attendance to deduct out-of-pocket expenses from their income tax.

IRS pointed out, however, that if a taxpayer attends the meeting or convention in connection with his own business interests and is therefore entitled to a deduction of his expenses, he will not be deprived of the deduction in the event he should be elected or appointed a delegate and, thus, as an incident of his attendance, serves the organization electing or appointing him.

"I think someone in the Engineering Department has been working too hard, sir!"

Navy Disputes Survey On College Graduates

A recent survey among top college graduates which showed that only twenty-nine per cent of them preferred Government employment has been challenged by the Navy which says that sixty per cent of college graduates it hired recently were in the top scholastic echelon of their class.

Navy officials referred to a survey made by an industrial psychologist at Picatinny Arsenal in Dover, N. J., which showed that among 1,016 seniors in engineering classes of colleges throughout the country, most of the top students (a "B" average or better) shunned Government in favor of industry or the academic life.

Frank DeWald, director of Navy's departmental civilian personnel division, said that of 155 college graduates recently hired for engineering, scientific and administrative management jobs, sixty per cent had "B" averages or better.

Two-Volume Report Released on Research

A report to the Navy which calls basic research "the lifeblood of the entire system of technological innovation" and advises the Navy to do more of it has recently been released through the Office of Technical Services, U. S. Department of Commerce.

The report, entitled *Basic Research in the Navy,* is based on findings of a two-year investigation of basic research effort by industry, government and universities. It was prepared by the Arthur D. Little Company for the Naval Research Advisory Committee.

Dealing particularly with the problem of the people who perform basic research, the report observes that "they are exceedingly rare in number." Most of them have doctorate degrees, although only about two per cent of the nation's college graduates continue their education through the doctorate level. Of this two per cent, according to the report, only about one in five remain in basic research, and only about one-half of these individuals have the outstanding talents for creative work in basic research and they produce eighty per cent of the scientific output. Thus, in the United States today there are only about 27,000 basic research scientists, of whom about half are producing the principal research results.

In a study of the annual number of doctoral degrees granted in the U. S. since 1932, it is revealed that the number of engineers, physicists and metallurgists receiving doctorates is increasing more rapidly than the number of chemists or mathematicians. An examination of this data, the report notes, presents a picture which indicates that the absolute number of science doctorates is growing, but the relative number of science doctorates is not.

Use AE's Readers' Service Department— See Page 68!

NLRB Adheres to Long-time Rule on Technical Employees

Following its policy re-examination of a separate vote for technical employees in the determination of bargaining units, the National Labor Relations Board has decided to adhere to its long-time rule that the technical employees will be excluded from units of production workers when either the employer or union objects to a combined unit.

The Board's reconsideration occured through the Litton Industries cases, in which the company, later joined by the union, urged that the technical employees be joined with production workers. Because of the importance of the issue, several major employers with substantial numbers of technical employees filed briefs urging retention of the separation policy. Litton contended that its operations (electronics) are such that technical employees are in close relationship to production employees under common working conditions and areas, as well as community of interest

A majority of the Board concluded "that there are inherent differences in the interests, background, and functions between technical workers and other employees." But Board member Phillip Ray Rodgers dissented on the ground that the policy amounts to allowing the parties to determine the unit placement of technicals, whereas the Board has a statutory duty to decide on the appropriate unit. Rodgers also said the policy applies a "purely mechanistic rule of exclusion," and fails to recognize a basic community of interest that exists between certain production workers and certain kinds of technical employees. Rodgers also noted that the Board "has never articulated a lucid or meaningful definition of the term, 'technical employee'."

The four-member majority said it will not apply the technical designation "mechanistically," but will limit its application so as to embrace only those employees whose work in fact satisfies its requirements." In each case the facts will have to support the claim for technical employee status. The majority did add, significantly, that technical employees are those who "do not meet the strict requirements of the term professional employees as defined in the Act but whose work is of a technical nature involving the use of independent judgment and requiring the exercise of specialized training usually acquired in colleges or technical schools or through special courses."

Applying this test to the Litton case, the Board majority found various types of technicians and draftsmen to be technical employees, although the decision shows that in most cases the employer required only a nine-month course in a trade school, or its equivalent in some cases. Data technicians and data specialists, however, were ruled outside the technical category.

Shortage of Competent Engineers Apparent

The shortage of competent engineers is painfully apparent when viewed in the light of recruiting techniques recently adopted by certain companies.

The *Industrial Relations News* reports that many happily employed engineers are receiving phone calls, letters, and even recorded announcements exhorting them to change jobs. Some even get mail and phone calls in their offices and labs.

The implications of such practices are many and of doubtful benefit to all concerned, the report adds. Many engineers feel the "shotgun" approach is damaging both to the profession and the companies using it. Most companies agree, saying that direct mail recruiting lowers employment standards and increases job turnover. The long-term negative effects, both practical and ethical, are viewed thusly:

- The ethics of the company involved would be suspect: "Direct mail advertising is something the engineer associates with a special deal for a magazine. . . . The initiative to change jobs should rest with the engineer. He shouldn't be dragooned out of his present post."
- Poor business relations would result. Not only would companies resent having their employees "raided," but mass mailing lists might reach engineers working for company customers.
- Restrictive legislation might result from pirating engineers employed in defense industries.
- Those who answer such pitches are not qualified engineers: "You attract the men who aren't doing well in their jobs, who are chronic discontents, who don't care about professional ethics."

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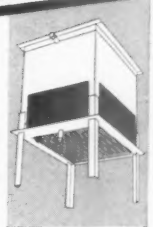
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American Engineer

National Engineers' Week Issue

ENGINEERING'S GREAT CHALLENGE— THE 1960's

By
JOHN T. KANE
American Engineer Staff

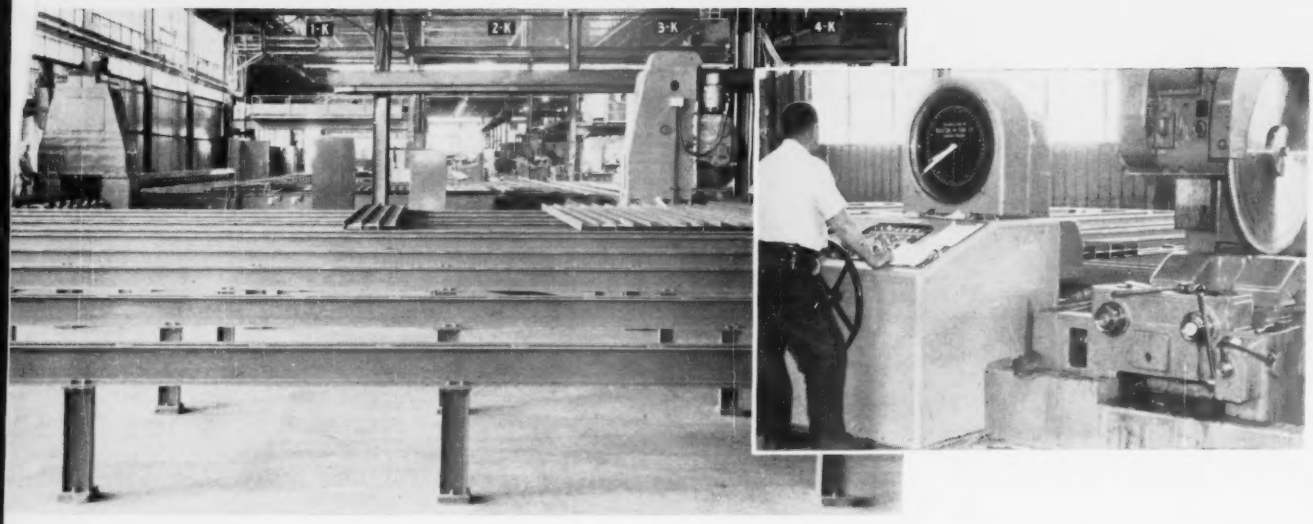
Picture Captions on Page 22.

Q. What lies ahead in the way of technological developments in the decade of the 1960's?

A. Everything.

No other answer to such a question could encompass the outpouring of creative engineering which, by all current signs and portents, should take place through the next ten years. Nor could any other answer suggest the intensity of this outpouring as engineers join their colleagues in the research sciences in everything from the acceleration of subnuclear particles to the determination of the age of the galaxies a billion light years away.

Just in terms of sheer numbers of people doing engineering work, the decade ahead should represent a massive increase in over-all technological effort. U.S. Office of Education statistics indicate that by 1970 the supply of engineers will be double that of 1957. Add to this doubling the considerable increase in the number of engineers with graduate degrees up to the doctorate; a research and development expenditure for the decade of perhaps $100 billion; the impetus of the missile and space programs and the exploration of the moon, and



Automation of all phases of industrial production will provide engineering with one of its major challenges through the coming decade.

an international competition in science and technology.

Who, in 1950, could have foreseen the engineering and scientific achievements of that decade? A small sampling of those achievements would include: The first man-made thermonuclear explosions; the nuclear powered submarine and the first voyage under the North Pole; space satellites around the earth and the sun; the intercontinental ballistic missile; a rocket impact on the moon, and a rocket sent around the moon; electric power from atomic reactors; supersonic aircraft flight; jet powered air transports; the discovery of radio emission from hydrogen in space; the discovery of the Van Allen radiation belts around the earth; the overthrow of the parity principle in basic physics; the bevatron; the developments and utilization of the transistor; the maser; the discovery and use of the tranquilizers and the Salk polio vaccine; the whole family of acrylic and polyester synthetic fibers; coast to coast TV broadcasting, and a definite start on the problem of controlled thermonuclear fusion.

Each of these achievements of the 1950's is now undergoing a concentrated exploitation along the lines of engineering R & D. It is the intensification of this latter activity which is actually providing the mainspring for much of the current dynamic in the areas of "pure" or nonapplied scientific searching. The most sensational scientific and technological adventures of the 1960's will probably be the exploration of the moon and the attempts to provide concrete answers to the staggering question of whether organic life exists elsewhere in our stellar neighborhood. Engineering knowledge and skill will put the scientists on the moon and return them to earth, and will provide the devices for peering down through the thin, cold atmosphere of Mars to see what, if anything, is growing there.

PAGE 21 PHOTOS

In the lower left hand photograph on the previous page, a ribbon-like crystal of germanium rises out of a molten pool in a crystal growing furance at the Westinghouse Research Laboratories. The thin, flat strips of germanium are used in the new engineering area of transistors and other semiconductors. The model of titanium dioxide, upper right on the same page, is representative of a class of oxide semiconductors which show great promise for thermoelectric devices.

One year from now there will be erected on the grounds of the 21st Century Exhibition in Seattle, Washington, a lunar housing simulator. This spherical, double-walled shelter and laboratory for a crew of five is being designed by structural engineers. The pace of rocket progress as we enter the new decade is such that the plans and specifications of this project may well serve

The robot controls required for working with radioactive material are typical of the extensive engineering effort called for as our industrial and research technology moves into the nuclear age.

as the prototype of the lunar housing which will be a part of the moonscape by 1970.

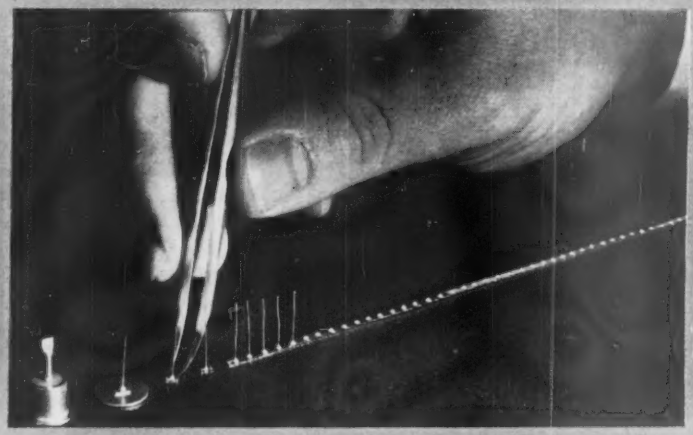
Before the end of 1960 there will be set in motion an activity called Project Ozma which will establish a radio watch in the direction of selected stars in the vicinity of our sun to find out if the inhabitants of some other planets are broadcasting intelligible signals to us. The project will utilize the 85-foot radio telescope at Green Bank, W. Va., along with a specially designed receiver. If these ambitious searchers hear anything in the way of a modulated signal through their complex listening devices (all, of course, the end products of recent engineering efforts in electronics) they will be carrying out the logical consequences of a discovery made by an engineer at the Bell telephone laboratories back in the 1930's who first picked up radio signals from outer space.

The major engineering challenges of the 1960's, at least as far as can be seen as the decade opens, will most likely be in such areas as the control and use of nuclear fission and thermonuclear fusion to produce electric power; the automating of production and assembly lines and processes in industry; the design, testing, operation, and production of vehicles capable of carrying man safely through space and returning him to earth, and the design and utilization of electronic computers with the ability to "think" on a level with our best human brains. Hard on the heels of these major challenges will be a long list of other problems in electronics, structures, chemistry, radioactive waste disposal and the use of radio isotopes in industry and the life sciences, transportation arteries, air pollution, and land, sea, and air vehicles.

Nucleonics

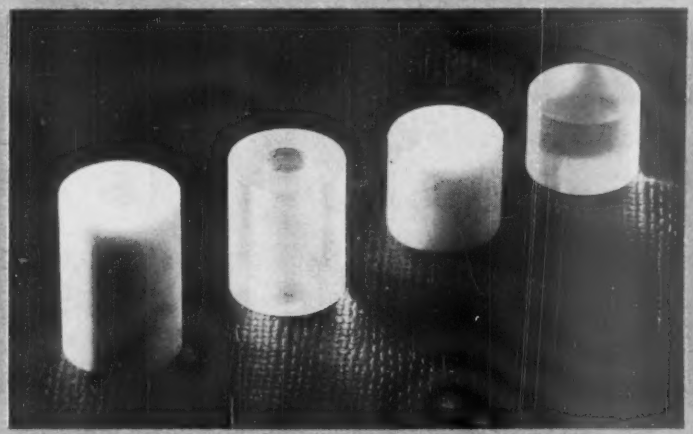
The tricky and complicated atom can certainly be counted on to absorb a giant slice of engineering effort during the years of the 1960's. The past decade has been one of many technical and economic frustrations in the general field of atomic energy as an electric power source. By the end of the 1950's there was only one large-scale nuclear power plant in this

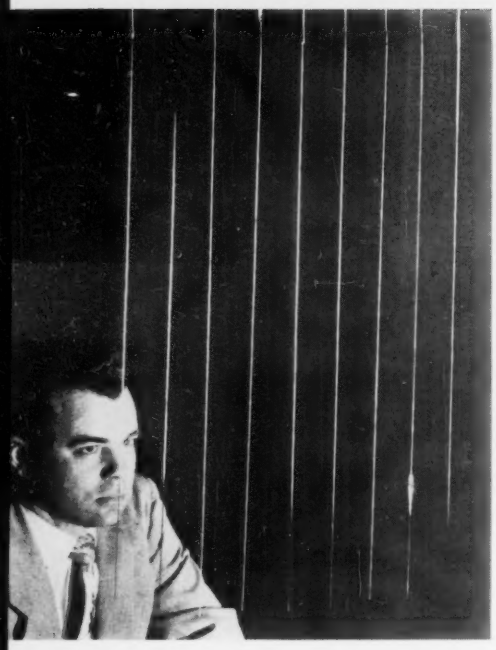
The application of systems engineering to large-scale business operations is indicated by this IBM 7090 computer which is functioning as the nerve center of American Airline's reservations network linking ticket offices in sixty-one cities.



The 1950's saw miniaturization take electronic components down to the level of the "barely visible." In the 1960's, this development will reduce some elements to below naked-eye visibility.

Engineering in solid state research and development has important implications for improving transistors and photodetectors. Below are samples of indium-antimony.





A new technique for growing long germanium dendrites represents a major breakthrough in the preparation of germanium and other semiconductor materials, and is a step on the way to the automated manufacture of transistors.

country in operation, the 60,000-kilowatt unit at Shippingport, Pa. A veritable plague of technical problems over the years has served to keep the atomic reactor in a highly noncompetitive position as a power source.

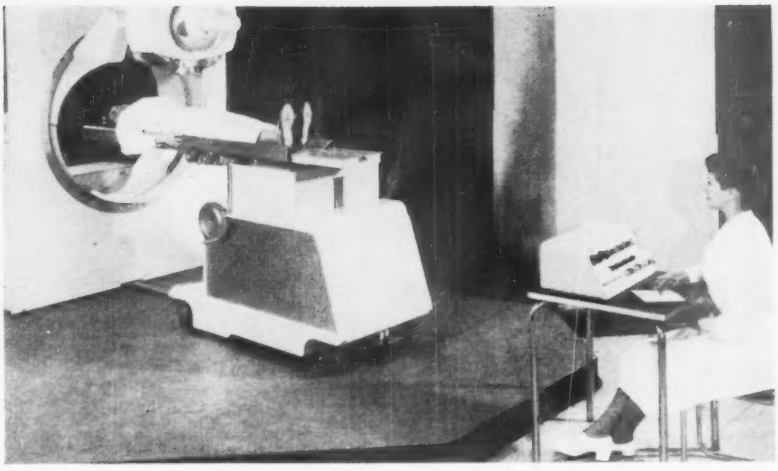
The trials and tribulations of atomic energy, aside from the inevitable political factors, has emphasized the very real nature of the engineering difficulties which must be surmounted in order to move into what so many self-appointed prophets glibly refer to as the "atomic age." What we have had during the 1950's was a series of long-term engineering feasibility studies, along with a variety of fiercely expensive testing programs, to provide a factual basis for a rational choice of approaches for the problem of utilizing nuclear energy, and to bring our basic industrial technology up to a level from which it can furnish the metallurgy, control devices, and other equipment to cope with the exotic requirements of fissioning nuclei.

This decade of engineering trial and error has resulted in current AEC studies which suggest that a 300,000-kilowatt nuclear power station using a pressurized water type of reactor could now be designed to produce electricity for 9.28 mills per kilowatt hour. This rate is near the competitive figure for power production in the New England area. The AEC is in the midst of drawing up a 10-year program which has the goal of obtaining competitive nuclear power in areas with high power costs.

BUT as the curtain falls on the 1950's with its decade of engineering R & D experience in nuclear fission, the curtain is rising on the next decade with a strange young nuclear performer straining impatiently in the wings to upstage all conventional atomic developments to date. This is the still infant but potentially Gargantuan heavyweight of thermonuclear fusion. Physicists in Project Sherwood, the AEC's program to harness thermonuclear fusion, have stated that by 1962 a laboratory temperature of some ninety million degrees Fahrenheit will have been achieved. This is "hotter" than the center of our sun, and, although this temperature will be reached for only about a millionth of a second, it is expected that provable fusion will take place among the nuclei of atoms of deuterium and tritium. These collisions and fusions should, theory holds, result in the generation of as much thermonuclear energy as the hot hydrogen isotopes are losing by radiation.

This will be, in effect, a controlled H-bomb type of reaction—the fundamental power source which fuels the stars and enables them to radiate energy into space for billions of years. At the moment, the physicists are doing most of the wrestling with the titanic and seemingly insurmountable complexities of reaching and handling such temperatures. The situation is, however, remarkably similar to that existing at the end of the 1940's when the nuclear reactor was still a laboratory situation. In 1950 there was hardly more than a handful of nuclear engineers. Today, their's is a thriving and growing branch of the profession. In 1960 there is not more than a handful of thermonu-

Suspension bridge records will be eclipsed in the 1960's as new structures are completed in this country and abroad. The Narrows Bridge, below, from Brooklyn to Staten Island, will have a suspended span stretching 4,260 feet from tower to tower.



Engineering design becomes part of medical healing in such devices as this cobalt sixty teletherapy unit for gamma radiation control.

clear engineers. The challenge of thermonuclear energy in the coming decade will, if previous developmental patterns are followed, be met in direct ratio to the magnitude and quality of the engineering application which is directed toward the problem.

The implications of a successful meeting of the thermonuclear challenge point to the achievement of a literally boundless energy source for the inhabitants of this planet. The deuterium or heavy hydrogen which can be used as the thermonuclear fuel is present in water to the extent that a time scale of billions of years would have to be constructed to cover the exhausting of the fuel source.

Automation

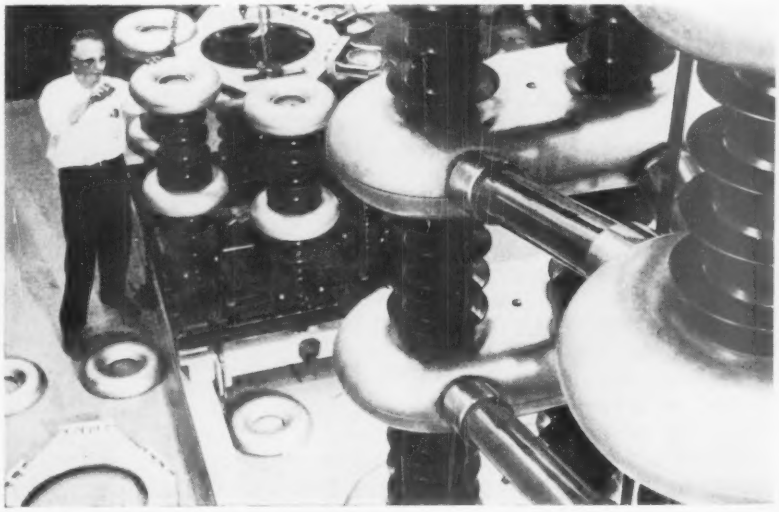
The automating of production lines in the automobile industry began in 1951. Since then, automation has spread throughout industry. Data processing systems are bringing automation to offices, banks, transportation systems, and a growing list of other commercial enterprises. Small ripples concerning the impact of automated production were felt in industry and organized labor during the 1950's. In the coming decade the technical, social, and economic forces of automated office and factory production will be greatly increased. As an extension of systems engineering to industrial and office methods, automation is replacing the clerk and production worker and creating a new kind of labor force made up of highly trained technicians who install, maintain, and supervise the operation of automated machinery. The engineering challenge of the 1960's revolves around the achievement of thoroughness and practicality of design, and the extending of workable concepts in automation to the smaller firms.

The 1960's...

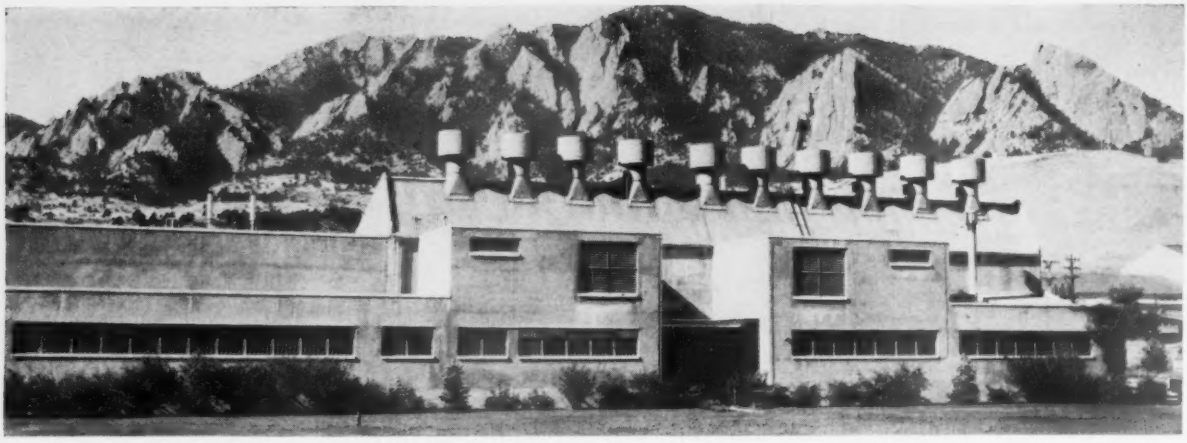
Electronics & Computers

If growth curves could be plotted for the various engineering specialties, it would surely be the general field of electronics which would show the most startling climb as the challenging 1960's get underway. Progress is so rapid in this field that advanced technical papers are regularly outdated well before publication. Measured by total accomplishments to date the mighty electron would appear considerably ahead of the mighty atom.

It is somewhat paradoxical that as the electronics industry reaches elephantine proportions ($9,000,000,000 worth of parts and components in 1959) the size of many of the objects it is creating are shrinking below the level of naked-eye visibility. A seemingly endless



Particle accelerators, such as this proton synchrotron at the Brookhaven National Laboratory, hold many of the keys to understanding the fundamental nature of matter.



The cryogenics engineering laboratory of the National Bureau of Standards at Boulder, Colorado, is the scene of research and testing in one of the newest areas in science and technology—that of studying materials at temperatures near absolute zero.

parade of these smaller and smaller devices are marched out to function in industry, missile and satellite equipment, computers, and research instruments. Transistors are going steadily down to the microscopic range, and something called a bead thermister measures temperature from about 76°F to 572°F, although it can easily pass through the eye of a needle.

Westinghouse engineers and physicists are engaged in a program involving the growing of germanium crystals which, it is claimed, may lead to a reduction of existing miniaturized electronic gear by a factor of 1,000. This concept of tampering with dimensions of a molecular order should take the average pocket-sized transistor radio circuitry, except for the power supply and speaker, down to the size of a match head. Westinghouse people are opening the decade with a phonograph amplifier, still in the laboratory, which is about one-twentieth the size of a dime.

Perhaps the clearest expression of the challenges which lie before the electronics engineer in the decade of the 1960's was given by the head of the electronics directorate of the Air Research and Development Command: "The first objective is to be able to design equipment with an inherent dependability, that is, an inherent life that is long enough to do the job. The second is to greatly reduce the number of thermal energy consumers in electronic systems. The third is to provide the means to increase, by several orders of magnitude, the amount of electronic functions performed per unit of volume."

It is in the area of electronic computer's that engineering developments have probably gone further in the direction of meeting such specific challenges. "Dwarfism" along with ever-increasing speed and computational ability seem to be the chief driving forces in computer design. The sprawling computer units of the early years of the decade now appear as some sort of exhibits in a technological museum. The closing months of 1959 fittingly saw the first performance reports on two examples of the next generation of super computers—the STRETCH, developed by IBM for Los Alamos, and the LARK, developed for the Livermore AEC facility by Sperry Rand. These units were designed to handle the mile-long problems of reactor design, hydrodynamics, and partial differential equations, and other mathematical analyses of similar immensity.

Before this new generation of super computers has even got its teeth into the problems which are waiting to be solved, a government program known as Project Lightning is investigating computer circuits using solid-state microwave components and thin magnetic films. This is expected to lead to the computer generation of the late 1960's which should begin to have a quantity of "memory" components approaching the order of magnitude of the neural cells in the human brain.

While engineering design in the 1960's is being applied to the build-

(Continued on page 58)

U.S. Naval forces will move further in the direction of a missile and nuclear combat fleet during the 1960's.

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

THE VESTIBULE OF TECHNOLOGY

JANUARY is the Month of Reports in official Washington—even though "reports" are the normal and never-ending lifeblood of bureaucracy. In addition to the spate of ordinary reports which emerge in January, as the result of the reassembling of Congress, there are the Big Three—State of the Union, Budget and Economic. By the end of the month these had been duly presented, praised by the Administration supporters, cussed by the opposition and analyzed by the editorial pundits.

Taken together, the Big Three reports reflect again, only with more emphasis, how technology has permeated and virtually taken over as the major influence in the shaping of national policy. The engineering-scientific focus is particularly evident in such areas as defense planning, education, foreign aid and others, as will be seen in the subsequent discussion.

In the State of the Union message, for example, the President said that "we now stand in the vestibule of a vast new technological age . . ." and he referred often to such things as the importance of technical assistance to underdeveloped nations, scientific research, space technology, etc.

Of more than casual interest to the engineering profession was the President's tribute "to American scientists and engineers, who in the past five years have had to telescope time and technology to develop these long-range ballistic missiles, where America had none before." The reference to engineers in the passage was in marked contrast to the practice in recent years of lumping all technical achievement under the sole banner of "scientists." Perhaps the President was influenced in his choice of words by the comment of T. Keith Glennan, head of the National Aeronautics and Space Administration, who told the American Association for the Advancement of Science in December that the drop in freshman engineering enrollment could be attributed, in part, to the failure to give engineers proper credit for their role in technological developments. Glennan cited the atomic bomb, nuclear power, the atomic submarine, satellites and space probes as engineering accomplishments which are always spoken of as scientific achievements.

As expected, there was considerable emphasis in the messages on the major question of national policy toward education—the impetus again coming from the requirements of the new technological age. The President is sticking to his strong opposition to any massive or all-out Federal aid to education, contending: "But the route to better trained minds is not through the swift administration of a Federal hypodermic or sustained financial transfusion. The educational process, essentially a local and personal responsibility, cannot be made to leap ahead by crash, centralized governmental action."

Nevertheless, there are substantial recommendations in the Administration programs bearing on Federal participation for the improvement of education:

- A supplemental appropriation of nearly $10 million to enlarge the loan program under the National Defense Education Act and an increase in the regular appropriation for the 1961 fiscal year to meet the success of the loan program.

- Increased appropriations for fellowships, grants to states for science, mathematic and foreign language teaching equipment, and for vocational training in occupations requiring scientific skills. The Budget message notes that as funds for training in the "new science-age skills" go up, Federal assistance for the older vocational training program is going down. This fact will undoubtedly stimulate the efforts of the vocational training people to push themselves into the new technician-type training.

- Federal guarantees of $1 billion in bonds, plus a Federal grant of up to twenty-five per cent of the principal, payable over a long term, to help colleges finance the construction of classrooms, housing, etc. This would replace the present college housing program which the President wants to expire.

- A "stretch-out" school aid bill which would underwrite local and state school bonds and extend Federal costs over a 20-to-30-year period. This is in marked contrast to strong moves in both Houses to enact a billion-dollar, or more, school construction bill with direct Federal grants.

- Science education programs administered by the National Science Foundation will increase $3 million under the Budget proposal.

One of the more interesting and important battles

of the current session involves the future of the interstate highway system. The President pointed to the fact that the roadbuilding program has slowed down considerably. He again urged an increase in highway fuel taxes by one-and-a-half cents a gallon for five years to meet estimated expenditure requirements, but most observers do not think Congress will accept this recommendation. As a result, there will probably be a major struggle over the future of the entire interstate highway system. Senator Albert Gore of Tennessee, often called the "father" of the present 13-year program, says it is "in very bad shape," with

Senator Byrd

Senator Kuchel

Senator Gore

Dr. Brode

expenditures outrunning income into the trust fund by substantial amounts. The 41,000-mile interstate system was originally estimated to cost $27.5 billion, but it is now estimated at $40 billion. Senator Gore wants to earmark sufficient funds from highway user taxes to keep the program on schedule, but Senator Thomas H. Kuchel of California is plugging for a major change in the financing arrangement by reverting to the original Administration plan of raising the funds through the sale of Federal bonds. A third major senatorial figure in this question is the powerful Harry Byrd of Virginia, chairman of the Senate Finance Committee. The Virginia solon is strongly opposed to extending the recent emergency highway financing into a permanent program. The extra taxes are "sins of profligacy," he states, and should be allowed to expire. The present odds are that Congress will not increase the gasoline taxes and will not vote additional funds from general revenue; consequently the 13-year program may be stretched into a considerably longer one.

In other public works areas, the Budget proposes to authorize needed funds to continue loans to small communities for needed public facilities, and surprisingly, offers to initiate funds for 42 high-priority water resources projects which will require $38 million in 1961, and a total of $496 million over the years. This recommendation reversed the Administration's "no new starts" policy, which was somewhat shattered last year when Congress overrode the President's veto of a public works bill.

The announced budget increase of about fifty per cent for the space program was the highlight of the section of the Budget message on defense changes. The total for the space program for fiscal 1961 will come to about $1.25 billion. The technological orientation of the Budget is shown also by the fact that the Budget Bureau grouped all research and development funds into a separate report, showing that $8.39 billion will be spent in this direction, a 5.7 per cent increase over the 1960 fiscal year. But of the total, only $600 million (7.2 per cent) will be for basic research "which has for its purpose increasing the fundamental knowledge that underlies the nation's . . . technological progress."

Dr. Wallace R. Brode, science adviser to the Secretary of State, speaking however, as retiring president of the American Association for the Advancement of Science, has stirred up new discussion of the question of a separate Department of Science. Directly related to the increased (and constantly increasing) Federal funds for research and development, Dr. Brode told the AAAS that a Department or some equivalent is needed to prevent chaos in the increasing competition for money and manpower from various Government and private groups. He is the only prominent Government official who has come out publicly for a separate Department of Science against the open coolness of the Administration toward the idea, but his call could generate some action this year, at least to the extent of passage of a pending bill to create a special study commission to evaluate the pros and cons of the hotly debated issue.

If additional proof were needed of the place of engineering and science in the Congressional scheme of deliberation, it was provided at month's end by the House Committee on Science and Astronautics, which has established an engineer-scientist "forum" of a dozen outstanding experts to exchange ideas and theories once or twice a year under the aegis of the Committee. Chairman Overton Brooks said, in establishing the group, "We shall provide for these men of science a forum in which they can speak out to the world on the problems that face it in basic and applied science, in space technology and space exploration. It is unfortunately true that many times scientists with important ideas that would help advance the interests of the United States and mankind in general have been unable to find anyone to listen to them. Theirs have been, on too many occasions, voices in the wilderness."

Among the well-known engineers in the group are Clifford C. Furnas, chancellor of the University of Buffalo; H. Guyford Stever, M.I.T.; Maurice J. Zucrow, professor of engineering, Purdue University, and Martin Goland, Southwest Research Institute.

Pres. Harold E. Mosher, P.E.

'In building for progress through the coming years we must not overlook the necessity to strengthen the engineering profession in as many ways as possible....'

NSPE PRESIDENT REVIEWS 'WEEK'

This month marks the tenth consecutive National Engineers' Week observance under the general sponsorship of the National Society of Professional Engineers. In this decade the observance has grown from little more than an announcement of the dates of the Week to a nation-wide program involving a large majority of NSPE's 400 chapters, and a considerable amount of cooperation from other engineering groups. This ten-year point might be a good place to ask the question as to just how much the engineering profession has benefited from the efforts which are put into an annual Engineers' Week.

I believe an objective review of the various Engineers' Week projects over the years would show these very definite benefits:

- The local programs which were planned and carried out quite often served as a focal point for stimulating chapter enthusiasm. Engineers' Week committees have been involved in activities which drew upon the volunteer services of many chapter members who are not regularly reached by other chapter projects.
- The local publicity obtained by the Engineers' Week projects has certainly called public attention to the engineering profession and to the individual engineers. This publicity has also resulted in an increase in awareness of the engineering profession on the part of newspaper editors, reporters, and radio and TV program directors.
- Publicity at the national level has generated an increased public interest in the engineer as a member of a profession, and as a vital contributor to our technological progress.
- Many local and state Engineers' Week projects are centered around the awarding of scholarships to deserving high school seniors. There were also many career conferences held during the Week at local high schools. These often featured talks by professional engineers as to the educational requirements for the various engineering specialities.
- Engineers' Week offers an opportunity for chapter members to give talks before civic groups, educational organizations, fraternal clubs, chambers of commerce, and so forth. Many a young engineer has been thus given a chance to express himself on his feet before an audience—something that more of us need and should have early in our careers. This public speaking part of the Engineers' Week program has also resulted in presenting a professional engineer to audiences that do not often have this contact.
- The Week has attracted the support and cooperation of a growing number of engineering societies. These groups have come to look on NSPE as taking the lead in promoting programs which call attention to the professional aspects of engineering.
- Articles and speeches during Engineers' Week have emphasized a number of critical national issues. Among these are the importance of providing a sound educational background for our young people in mathematics and the basic physical sciences, the need to push forward into the exploration of our solar system and beyond, and the importance of maintaining our leadership in science and technology.

Those of you who have participated in Engineers' Week projects over the past decade can probably add to this list. The observance is an example of the functioning of NSPE's three-level structure in meeting the challenge of a nation-wide and profession-wide promotional activity. The themes utilized each year have served to dramatize, at the local, state, and national levels, some of the major issues before the profession.

It would be my hope that the end of the coming decade will see a continuance of an annual observance dedicated to drawing widespread public notice to the contributions and achievements of engineering.

The theme of the Week, "Engineering's Great Challenge . . . The 1960's," is particularly appropriate as we enter upon a decade which will doubtless present the profession with a long list of challenges in nucleonics, electronics, structures, computing devices, and so on. In building for progress through the coming decade we must not overlook the necessity to strengthen the engineering profession in as many ways as possible. The observance of an annual National Engineers' Week is one of the ways in which we can participate in this strengthening activity.

An Important AE Survey . . .

How Recessions Affect Engineers

By

JOSEPH C. LEWIS

American Engineer Staff

FROM 1951 to 1957 engineers rode a beautiful pink cloud of full employment, rising salaries, and increasing security. It was a period of high prosperity such as the profession had never before experienced.

Suddenly, in late 1957, this bright picture began to show some fading around the edges. Job opportunities became less numerous; pay increases, particularly those of the merit variety, were not so plentiful; companies which had been spending thousands of dollars in recruiting slowed their efforts or, in some cases, completely eliminated their visits to the campuses of engineering schools. And in not a few cases that ugly word "layoff" became a reality for the professional engineer.

The reasons for this downward trend were, of course, directly attributable to the economic recession which hit American business and industry in 1957 and 1958. By any normal standards the engineer, with some notable exceptions, rode out the recession without serious difficulty, although many of the optimum employment conditions showed a definite leveling out. Today, the American economy is once again on the rise, but the 1957-1958 recession is still recent and real enough to hold interest as an indicator of what the professional engineer might face in a prolonged recession or depression.

Economists are still picking the bones of that economic downturn for trends, reasons and effects, but little attention has been given the question of what happened to the nation's engineering manpower during the period. Hoping to find some of the answers, the AMERICAN ENGINEER has surveyed major industries, businesses, chief engineers, Federal and state employment, and labor officials.

In general terms the survey showed these major trends:

- Job openings for engineers contracted sharply.
- Layoffs of engineers did occur, particularly in defense-oriented industries.
- Recruiting was lower with some companies placing more emphasis on quality than in previous years.
- Salary reductions were rare among engineers, but pay increases, especially merit raises, were in many instances curtailed or eliminated during the recession.

In answer to the AMERICAN ENGINEER survey, industry reported a wide variance of experience and practice in the handling of its professional engineers during the recession. Fourteen of the eighty-seven firms replying to the questionnaire reported outright layoffs

In General Terms the Survey Showed:

- **Job openings for engineers contracted sharply.**
- **Layoffs of engineers did occur.**
- **Recruiting of college graduates was reduced.**
- **Salary reductions were rare, but pay increases were curtailed in many instances.**

of engineering personnel. Nineteen of the other companies listed cutbacks in promotions or merit pay increases (in some cases both were eliminated). On the plus side of the ledger, fifty-four of the companies answering reported neither layoffs nor pay cuts.

Layoffs apparently were less significant than was a trend of overall reduction in the number of job openings in engineering fields during the recession period. Many companies faced with diminishing profits did not replace personnel who retired or resigned. And recruiting, particularly of young inexperienced engineers, apparently was sharply curtailed. So, while the engineer may not have felt the direct sting of layoff, he did find that available job openings were considerably fewer as a result of the economic downturn.

This trend is plainly reflected in figures on file with the Bureau of Employment Security of the Department of Labor in Washington, D. C. The BES started publishing a monthly bulletin on "Current Labor Market Conditions in Engineering, Scientific and Technical Occupations" during the height of the 1958 recession. Its first report in July, 1958, showed that job openings placed in a nation-wide clearance by the various state employment offices declined about fifty-eight per cent during the period from March, 1957, to March, 1958. In January, 1957, a high water mark in the nation's economy, the BES listed 6,349 openings in its nation-wide clearance pool of job openings for engineers. A year later—January, 1958—openings had dropped to 1,817.

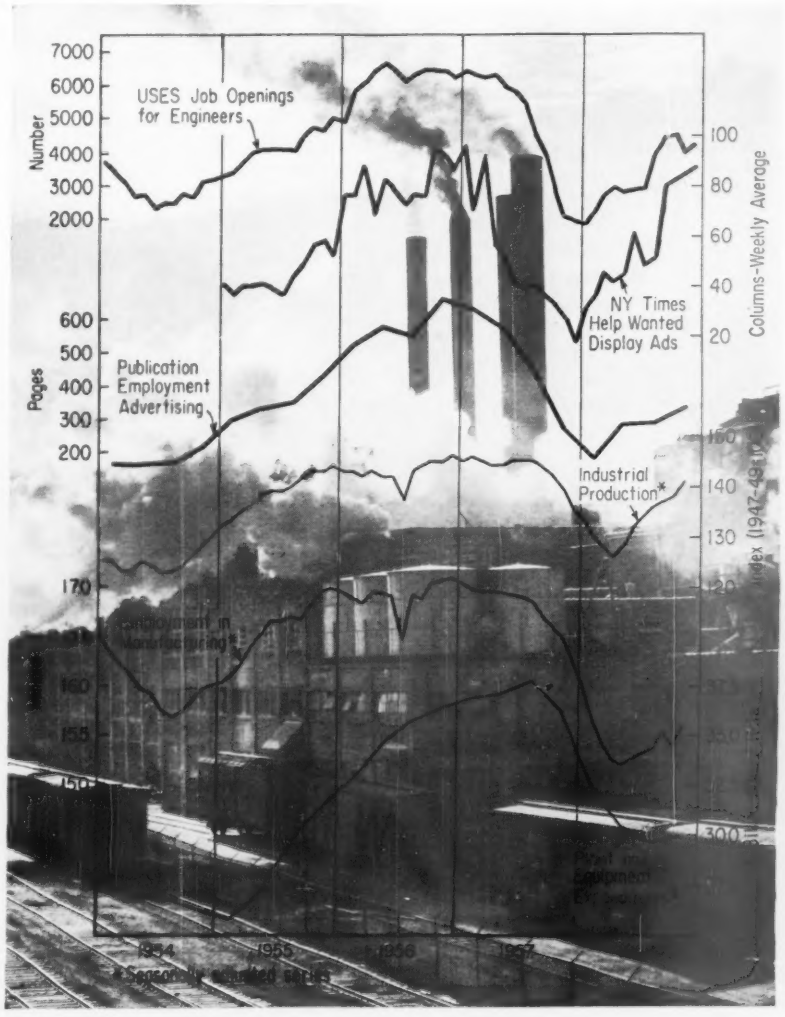
At the same time the BES reported that, "as a result of the recession and last year's defense cutbacks an excessive supply of job applicants in some engineering, scientific and technical occupations existed in most of the 30 major industrial centers surveyed in detail as of May 1, 1958."

A look at BES reports from some of these major industrial centers illustrates the severity of the recession in the summer of 1958. (The following is based on excerpts from BES reports published in July, 1958.)

Detroit, Michigan—The labor supply for all occupations was very large in the area and demand was limited, principally to a small number of openings for mechanical engineers. The supply of mechanical engineers greatly exceeded the number of openings as a result of layoffs in the motor vehicle and equipment industries.

That was July, 1958. Three months later, in October, the situation had worsened in respect to engineering personnel. The number of applications of engineering personnel seeking work through the assistance of the Detroit branch office (Michigan Employment Security Commission) had increased 14.2 per cent during the two months, rising from 701 in July to 804 in September. At that time layoffs had penetrated farther back in seniority than at any time for many years.

Chicago, Illinois — Uncertainty about government contracts and the impact of the recession changed the situation (in 1958) from one of acute shortages to a slight surplus of engineers. As an example of this fact, the city engineering department successfully filled all vacancies for mechanical, civil, structural, and electrical engineers and limited interviewing to college graduates with at least ten years' experience in a specific field. Still in short supply were structural engineers needed by architectural firms for designing highway bridges. In some instances, salaries were lower than a year ago, but the chief difference was in a trend



toward raising hiring specifications in order to obtain better qualified applicants as replacements.

Milwaukee, Wisconsin—Over the year (1957-1958) the number of applicants showed a rising trend and the demand for engineers showed a declining trend; however, a short labor supply prevailed for all of the engineering occupations except aeronautical and mining engineers. Openings for metallurgical, chemical, industrial and mechanical engineers increased slightly over March (1958), but were fewer than a year ago. . . . (Clearance openings increased to fifty-two in May, 1958, from eight in March, but were still one-half of the March, 1957, total.)

Minneapolis-St. Paul, Minnesota —Job openings for engineers dropped during the year. In May, 1958, electrical engineers were the only group in short supply. It can be assumed that there is no longer a shortage of engineers in the area (as of July, 1958).

Los Angeles, California—The period between 1950 and 1957 was one of dynamic growth for engineering employment in the area. During that period the labor demand-supply relationship was one of chronic and often acute shortage and requirements for many of the routine engineering jobs were diluted. Relaxation of hiring specifications made jobs available to workers with limited academic training in engineering. Setbacks in the total economy during the past year affected the demand for engineers. Some phases of this demand also suffered from a shift in defense procurement from manned aircraft to missiles. As a result of the stretchout in aircraft contracts a number of engineering jobs in production activity were eliminated. Thus, the July, 1958, demand-supply relationship showed a surplus of workers coexisting with unfilled needs for engineers in research and development activities —in some cases even within the same company. Demand was virtually restricted to college graduates and recruiting was highly selective. (From a total of 529 openings for engineers in March, 1957, the number declined to seventy-five in March, 1958, but increased in May to 162.)

San Francisco-Oakland, California—Because of heavy cutbacks in durable goods manufacturing especially nonelectrical machinery, mechanical and electrical engineers were available for jobs in numbers which had been uncommon to the area for a long time. Both construction and engineering services declined reducing the demand for civil engineers . . . .

New Orleans, Louisiana – The number of job openings showed a drastic drop over the year (1958), mainly because of curtailments in local industries—chemicals, petroleum and aluminum—which temporarily halted extensive expansion programs. Requests from industry for graduates of engineering schools was reported to be the lowest in years, with some graduates in chemical and civil engineering still unemployed (July, 1958).

Houston-Baytown, Texas – Supply (as of July, 1958) generally exceeded any demand that had existed for several months, although this situation is the reverse of the demand-supply relationship of one year ago. Contrary also to past years, there had been only limited recruitment of recent graduates. . . .

Dallas, Texas—Outside of the aircraft industry there appears to have been considerably less demand for engineers in the area than existed a year ago.

That's how the situation stood in these major centers in July, 1958. Some areas—Seattle, Cincinnati, Boston – presented a somewhat brighter picture of employment opportunities. But, the trend in that mid-recession year was down with employers becoming more and more selective.

Other economic indicators during 1958 pointed to this growing erosion of the silver lining on the engineers' employment picture.

NUMBER OF JOB APPLICANTS IN 30 MAJOR LABOR MARKET AREAS

	July, 1958	July, 1959
Engineers (Total)	8,537	4,615
Metallurgical	153	74
Chemical	611	335
Civil	1,204	918
Electrical	1,241	684
Industrial	1,840	830
Aeronautical	153	74
Mining	93	58
Mechanical	3,242	1,642

CLASSIFIED advertising in the Sunday *New York Times*, considered one of the barometers of engineering demand, followed the business curve closely. In 1955 and 1956, advertising for "Engineers Wanted" rose steadily. By the end of 1956, the number of columns was twice as great as that carried in early 1955. But, in 1957, advertising for engineers declined sharply before beginning a new rise in 1958. Employment advertising in McGraw-Hill publications climbed from 162 pages in the second quarter of 1954 to 663 pages in the last quarter of 1956. In 1957 it started dropping and fell to 187 pages in the first quarter of 1958.

The new graduate who emerged

in the shrinking industrial world of 1958 may have noticed the economic pinch more than did his older counterparts. Recruiting was definitely down; job offers were certainly less numerous, and companies were becoming increasingly selective.

Surveying the recruiting situation in February of 1958, the *Wall Street Journal* found engineering students showing more interest in placement interviews than they had in previous years.

Campus visits by companies, the survey showed, were down considerably from the previous year with selectivity being the key to the recruiting effort. The *Journal* cited a forty per cent reduction in the need for field engineers at Hughes Aircraft Company in Los Angeles as an example of reduced demand in 1958.

L. R. Hillyard, of Iowa State College, wrote in the December, 1958, issue of the *Journal of College Placement:*

The nation-wide economic recession of the past year was statistically felt by the 1957-1958 engineering graduates. Industry had fewer jobs to offer and therefore could be more selective than in the past. June graduates received an average of 3.4 job offers as compared with 6.8 offers for the June, 1957, graduate. Ninety-five per cent of the engineering graduates were placed by graduation time, and it would probably be safe to say that the remaining five per cent are now employed or are in military service. Starting salaries remained nearly constant in comparison with those of the previous year.

At nearby Northwestern University, Frank S. Endicott came up with a somewhat similar conclusion in his annual survey of the college placement situation. In a paper presented before the Seventh Conference on Scientific Manpower, Dr. Endicott reported that about half of the companies which regularly recruit engineers cut back their 1958 quotas. A group of 233 representative companies reporting to the Midwest College Placement Association in September, 1958, indicated that their final needs for technical men were seventy-eight per cent of their anticipated needs at the beginning of the recruiting period. Actual hires were eighty-nine per cent of final requirements, a cutback to about sixty-nine per cent of originally anticipated needs.

The size of the cutback, Dr. Endicott reported, was due in a large measure to the reduction of quotas by a relatively small number of large corporations normally hiring several hundred engineers.

There is some evidence, though not conclusive, that the recession may have forced something of a leveling off process on starting salaries for new graduates. Many have described it as a return to "normalcy" in the recruitment of inexperienced engineers.

Dr. Endicott noted that starting salaries for beginning engineers have increased by about ninety percent since 1948. From 1951 to 1957 the average increase per year was eleven per cent. But the $472 per month starting salary paid to starting engineers in 1958 was only about four per cent higher than the average for 1957—a seven per cent drop in the average for the preceding six years.

But, the recession was something more than a reduction in job openings, less recruiting and a possible cut in the increase of starting salaries. For some engineers, it actually meant a loss of a job. True, in many of these cases the engineer was able to simply walk across the street and start work with a new firm at a rather handsome salary. Not all were so lucky. Some had to wait awhile for the next opening and in many cases it apparently meant a relocation to a more prosperous area.

Just how widespread, how serious and how prolonged were these layoffs is still a debatable question. The AMERICAN ENGINEER survey did turn up a number (although a definite minority) which had layoffs and it can be assumed that these firms were not wholly untypical examples of recession-hit industry.

One firm which returned its questionnaire unsigned reported that eleven per cent of its central engineering department was laid off during the recession. Most of the layoffs were in plant design and construction with research and

Down . . . Down . . .

Cutbacks of government spending in 1957 and 1958 caused job opportunities in many defense industries to plummet like this missile. In California, the first big layoff of the recession hit in July and August of 1957 when cancellation of a major missile contract forced the dropping of 10,000 employees at North American Aviation. Another example of a defense cut occurred at Columbus, Ohio where about 500 engineers and draftsmen were laid off when government contracts were reduced.

technical activities affected only slightly, the company reported.

This company reported that it made an extensive effort to help the laid-off engineers find new employment and estimated ninety-nine per cent success in its attempts. Engineers who were retained by this company suffered no pay cuts or loss of normal increases, but opportunities for promotion "were lessened to some degree." The company also reported that its recruiting was limited to Ph.D. candidates during the recession.

One of the country's big employers of engineers, Dow Chemical Company, reported that in May of 1958 it instituted a ten per cent reduction of salaried forces. Individual managers of the company's divisions made their own decisions on the cutbacks and Dow reported it had no total figure available for publication on the total number of engineers affected. It did say that process engineers, design engineers, technical service engineers, and sales engineers were included in the cuts.

In order to help these engineers find new jobs, Dow converted its Technical Employment Department into a full-time placement office, contacted other companies, provided counseling service, and prepared resumes. Within three months, the company reported, seventy-one per cent of the science and engineering graduates were known to be placed elsewhere, thirteen per cent were still seeking new positions and locations of sixteen per cent were unknown.

Dow reported that it did not institute a general salary reduction and said that promotional salary increases continued during the recession. However, regular salaried employee merit reviews were delayed until the reduction in force was completed and increases during 1958 "tended to be smaller than usual which reflected the reduced profit of the company."

The AMERICAN ENGINEER found similar experiences in other sections of the country. The A. O. Smith Corporation in Milwaukee reported that it had to lay off twenty-nine of its engineers; a large California firm, which did not identify itself, cut 138 engineers from its payroll; another company listed sixty engineers among its layoffs; the Piasecki Aircraft Corporation in Philadelphia reported a reduction in force of fifteen engineers during the recession. There were others ranging from minor layoffs of two or three engineers up to as many as thirty.

These were, of course, the companies which answered the questionnaire. Undoubtedly a number of firms which dodged the questionnaire completely also found it necessary to lay off engineering personnel.

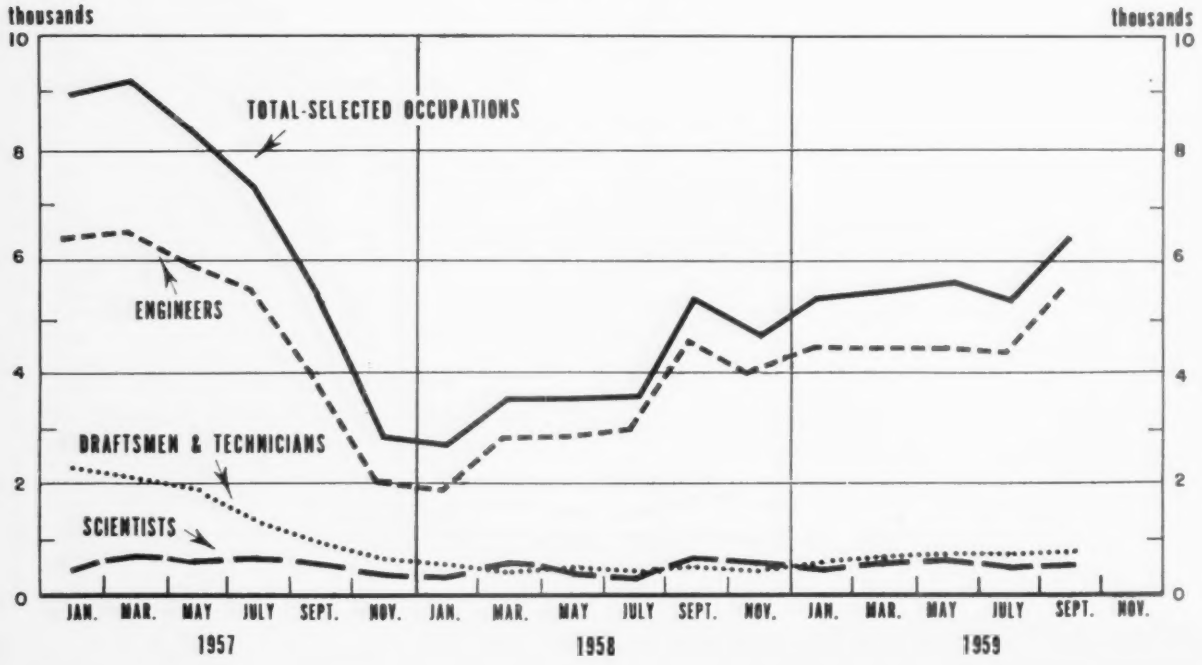
Like Dow, most of the companies which laid off made concrete efforts to relocate their engineers with other companies. Success in this program was varied.

Donald Devine, of the personnel administration of A. O. Smith

(Continued on page 61)

Trend in Job Openings Placed in Inter-Area Clearance by Public Employment Offices

(Bimonthly, 1957-1959)



Professional Profiles

Meet Frederick C. Gardner, P.E., president of Ebasco Services Incorporated, who has been with the firm since graduation.

The engineer is an important part of America's progress and, as such, he should make his voice heard more often in community affairs.

That's the advice of Frederick C. Gardner, P.E., the 1959 winner of the "Distinguished Engineer in Industry" award presented annually by the New York State Society of Professional Engineers.

"The engineer is seldom an opinion leader in the community in which he lives . . . he is inclined to do his job to the best of his ability and let others steer the ship. This we all know should not be the case," the New York engineer commented.

Mr. Gardner, as president of Ebasco Services Incorporated, directs some of the biggest engineering operations in the world. And he is a firm believer in engineering as a profession and as an important contributor to America's future.

"Our modern existence to a greatly increasing extent is demanding superior competence of the technical people who design and build its facilities," Mr. Gardner said. "The engineer must meet this responsibility by keeping ahead of the developments in his field and by insisting that the universities improve their courses of study in light of what appears to be ahead for the nation.

"The professional engineer, trained to think straight, solve problems and plan for the future has become an intimate part of our American life. His contribution to our economy is visible in the works he has built and the industries he has helped to develop. The engineer must meet even greater responsibilities; for the future of our country and welfare of its people may depend on how well the engineer can cope with the problems of tomorrow."

Mr. Gardner has been with Ebasco since he received his degree in civil engineering from North Carolina State College in 1917. His first job with the international firm was a draftsman on investigation of hydroelectric power sites in North Carolina. After serving as construction engineer in Pennsylvania for ten years, he was transferred to the company's general office in New York in 1929 where he assisted in the supervision of construction activities.

In 1939 he was promoted to head of the design and construction division. Five years later he was named engineering manager and then 1945 the company moved him up to vice president. In 1952, he became executive vice president and 1954 he took over the job as president of the entire company.

Today, he is a director of Electric Bond and Share Company, Ebasco Services Incorporated, Chemical Construction Corporation and Commerce and Industry Association of New York.

He is a member of the NYSSPE, American Society of Civil Engineers, the Engineers Club of New York, Recess Club, Manhasset Bay Yacht Club, and North Hempstead Country Club.

Engineers, Doctors, Dentists, Architects . . .

Professions Organize in Michigan To Provide Mutual Advancement

Mr. Saulter

By

NATHANIEL O. SAULTER, P.E.*

Charter Member, Board of Directors, MAP

THE Michigan Association of the Professions was legally founded as a nonprofit organization on December 1, 1958, in Lansing, Michigan, with the signing of the Articles of Incorporation. This event marked an extremely important milestone in the advancement of all the professions and, particularly, the engineering profession.

As far as we know, this is the first attempt for a state society of professional engineers, on a par with a state medical society, a state bar association, a state dental association and a state society of architects, to join forces to provide for the general advancement of professional ideals and the promotion of professional welfare. Provisions were made in the bylaws of MAP to admit other state professional organizations upon proof of eligibility.

An association of this kind, dedicated to all professions, has been needed for a long time. It has long been the opinion of the forward-looking leaders of the various professions in our state that each of the professions can serve the public better if its practitioners and leaders are familiar with the problems and activities of other professions.

It is obvious that powerful groups of industry, labor and commerce strongly influence our way of life through legislation and public education. One of the objectives of MAP is to provide the professions equality in representation in the government and public opinion with other groups. The need for cooperative action among the professions has become imperative.

This amalgamation of professions was formed primarily in the interest of the public, as well as for their own mutual welfare. The objective is to strengthen the traditional rights and privileges of the professions and, at the same time, provide more effectively adequate professional services based on skill and integrity.

Prior to the incorporation of MAP, a survey was conducted to obtain opinions from the entire membership of the five statewide professional societies—totaling 21,816—to determine the desirability for the formation of such an organization. The majority voted overwhelmingly (79.15 per cent) in favor of organizing MAP. The survey also revealed that the members placed emphasis on the idealistic factors involved, rather than personal services to the member himself. Thus, it was concluded from this survey that the organization should be formed and that it will receive financial support.

The plans included a membership that would be made up of all professional persons legally registered, certified or licensed in a particular profession or otherwise

* *Mr. Saulter is president of the Acorn Iron Works, Inc., Detroit, Michigan, and president of the Michigan SPE.*

qualified as a member of the medical, dental, legal, architectural and engineering professions, and such other professions as might subsequently be admitted. No individual professional person will be qualified for membership in MAP without first being a member in good standing in his own individual professional society.

The objectives of MAP are well defined in its Statement of Purposes:

The encouragement of participation of all the professions in programs having for their purpose the advancement of professional ideals and professional welfare; the promotion of better understanding between and among the several professions; the promotion of a free interchange of opinion and information among its members on subjects of mutual professional interest; the promotion of closer contact between the leaders of the learned professions; the fostering of ever higher standards of professional ethics and conduct; the promotion of programs and measures designed to protect the public and the professions against encroachments on professional practice by those not qualified; the promotion of programs designed to offer professional and pre-professional students more adequate preparation for professional life; the promotion of programs and measures designed to assist young professionals in meeting the problems of their respective professions, and the stimulation and fostering of leadership by the professions in public service activities on community, state and national levels.

The following standing committees are authorized by the bylaws:

A. *Committee on Legislation*

The legislative activity of MAP will be bi-partisan in nature and will interest itself in legislation which directly affects the professionalism of the professions, the general welfare of the professions and of the public. This organization is not designed or intended to be a "political organization."

B. *Committee on Public Relations*

This service rendered by MAP will correlate with and complement the public relations programs of the state professional organizations. It will use media such as newspapers, radio, TV, literature, etc.

C. *Committee on Education*

The objectives of this Committee will include pre-college testing of students, scholarships, and professional development.

D. *Committee on Business Techniques and Services*

This will include research and statistical studies, business counseling, group purchasing, insurance, investment, etc.

E. *Committee on Publications.*

The response to invitations to the members of the five original professional societies to become charter members of MAP has been enthusiastic. During the first four weeks following the invitations, one thousand membership applications were received and approved. New applications are being received daily and processed in the administrative offices of MAP.

The first president of this new organization is William M. LeFevre, M.D., of Muskegon, a councilor of the Michigan State Medical Society. Other charter officers and board members are: Gilbert B. Saltonstall, M.D., of Charlevoix; Floyd D. Ostrander, D.D.S., of Ann Arbor; John G. Nolan, D.D.S., of Lansing; Frederick VonVoigtlander, P.E., of Ann Arbor; N. O. Saulter, P.E., of Detroit; Elmer J. Manson, A.I.A., of Lansing; James B. Morison, A.I.A., of Detroit, and Attorney Lester B. Dodd of Detroit. Mr. Dodd is also legal counsel for MAP. Hugh W. Brenneman of Lansing is the executive director of the new organization.

Testifying before Congressional committees on legislation affecting professionalism will be an important task confronting The Michigan Association of the Professions.

Nation-wide interest is being evidenced by the many requests for information about the association coming into MAP headquarters and into the offices of the state professional societies and their local units. The executive offices of MAP are located at 712 Abbott Rd., East Lansing, Michigan.—**End.**

A LISTING OF THE STATE BOARDS

For the convenience of our readers, we are listing below the names and addresses of the various State Registration Boards. It is suggested that this issue of the American Engineer be filed for future use.

Alabama State Board of Registration for Professional Engineers and Land Surveyors
Clifton C. Cobb, Executive Secretary
64 North Union St.—Rm. 606
Montgomery 4, Alabama

Alaska Territorial Board of Engineers and Architects Examiners
R. V. Killewich, Secretary
Box 1416
Juneau, Alaska

Arizona State Board of Technical Registration
Mrs. Rayma Neeb, Executive Secretary
Room 403, 128 N. 1st Avenue
Phoenix, Arizona

Arkansas State Board of Registration for Professional Engineers
B. Allan Curry, Secretary-Treasurer
P. O. Box 1117, Park Hill Station
North Little Rock, Arkansas

California State Board of Registration for Civil and Professional Engineers
Arthur I. Flaherty, Executive Secretary
529 Business and Professions Building
1020 N Street
Sacramento 14, California

Canal Zone Board of Registration for Architects and Professional Engineers
Gerald A. Doyle, Jr., Secretary
P. O. Box 223
Balboa Heights, Canal Zone

Colorado State Board of Registration for Professional Engineers and Land Surveyors
J. E. Whitten, Secretary
State Capitol
Room 20
Denver, Colorado

Connecticut State Board of Registration for Professional Engineers and Land Surveyors
Charles H. Coogan, Jr., Secretary
30 Oak Street
Hartford 6, Connecticut

Delaware State Board of Registration for Professional Engineers and Land Surveyors
Clarence H. Evans, Secretary
11 East 12th St.
Wilmington 1, Delaware

District of Columbia Board of Registration for Professional Engineers
Mrs. Lacey W. Coad, Executive Secretary
1740 Massachusetts Ave., N. W.
Washington 6, D. C.

Florida State Board of Engineer Examiners
Mrs. Ann P. Clover, Executive Secretary
408 John F. Seagel Building,
Gainesville, Florida

Georgia State Board of Registration for Professional Engineers and Land Surveyors
Cecil L. Clifton, Joint Secretary
224 State Capitol
Atlanta, Georgia

Hawaii Board of Registration for Professional Engineers, Architects and Land Surveyors
William C. Furer, Executive Secretary
1909 Aleo Place (Manoa),
Honolulu 14, Hawaii

Idaho State Board of Engineering Examiners
Orland C. Mayer, Secretary
1220 Idaho St., Idaho Power Building
Boise, Idaho

Illinois Professional Engineers' Examining Committee
Fredric B. Selcke, Supt. of Registration
Room 109
State Capitol
Springfield, Illinois

Indiana State Board of Registration for Professional Engineers and Land Surveyors
E. C. Leibing, Secretary
145 W. Washington St.
Indianapolis 4, Indiana

Iowa State Board of Engineering Examiners
W. Grant Cunningham, Secretary
State House
Des Moines 19, Iowa

Kansas State Board of Engineering Examiners
Mrs. Della Sterrett, Executive Secretary
1159 W. State Office Building
Topeka, Kansas

Kentucky State Board of Registration for Professional Engineers
C. S. Crouse, Secretary-Treasurer
223 Mineral Industries Building
120 Graham Ave.
Lexington, Kentucky

Louisiana State Board of Registration for Professional Engineers and Land Surveyors
F. W. MacDonald, Executive Secretary
Tulane University
Rm. 208, Civil Engineers Building
New Orleans 18, Louisiana

Maine State Board of Registration for Professional Engineers
Bryant L. Hopkins, Secretary
Box 103
Waterville, Maine

Maryland State Board of Registration for Professional Engineers and Land Surveyors
J. W. Gore, Secretary
301 West Preston St.
Baltimore 1, Maryland

Massachusetts State Board of Registration of Professional Engineers and Land Surveyors
L. T. Schofield, Secretary
48 Park St.
Framingham, Mass.

Michigan State Board of Registration for Architects, Professional Engineers and Land Surveyors
Henry G. Groehn, Executive Secretary
1604 Cadillac Square Building
Detroit 26, Michigan

Minnesota State Board of Registration for Architects, Engineers and Land Surveyors
Miss Helen D. Carlson, Executive Secretary
316 New York Building
St. Paul 1, Minnesota

Mississippi State Board of Registration for Professional Engineers
O. B. Curtis, Sr., Secretary
P. O. Box 3
Jackson, Mississippi

Missouri State Board of Registration for Architects and Professional Engineers
Mrs. Clemmie V. Wall, Secretary
Box 184
Jefferson City, Missouri

Montana State Board of Registration for Professional Engineers and Land Surveyors
Harvey W. Taylor, Executive Secretary
P. O. Drawer 291, Capitol Post Office
Helena, Montana

Nebraska State Board of Examiners for Professional Engineers and Architects
Roy M. Green, Secretary
512 Trust Bldg., 941 "O" Street
Lincoln 8, Nebraska

Nevada State Board of Registered Professional Engineers
Stanley G. Palmer, Secretary
University Station
P. O. Box 9052
Reno, Nevada

New Hampshire State Board of Registration for Professional Engineers
W. E. Haynes, Secretary
c/o Secretary of State, State House
Concord, New Hampshire

New Jersey State Board of Professional Engineers and Land Surveyors
Thomas E. Heathcote
Secretary-Director
1100 Raymond Blvd.
Newark 2, New Jersey

New Mexico State Board of Registration for Professional Engineers and Land Surveyors
Mrs. Sybel Clagett, Asst. Secretary
407 Don Gasper Ave.
Santa Fe, New Mexico

New York State Board of Examiners of Professional Engineers and Land Surveyors
Newell L. Freeman, Secretary
c/o New York State Education Dept.
23 South Pearl Street
Albany 7, New York

North Carolina State Board of Registration for Professional Engineers and Land Surveyors
Robert B. Rice, Secretary
P. O. Box 5131, N. C. State College
Raleigh, North Carolina

North Dakota State Board of Registration for Professional Engineers
A. L. Bavone, Secretary
P. O. Box 1265
Minot, North Dakota

Ohio State Board of Registration for Professional Engineers and Surveyors
Robert N. Waid, Secretary
21 West Broad Street
Columbus 15, Ohio

Oklahoma State Board of Registration for Professional Engineers
Gwynne B. Hill, Secretary
2301 Classen Blvd., 225 Cameron Bldg.
Oklahoma City, Oklahoma

Oregon State Board of Engineering Examiners
Paul D. Christerson, Secretary
717 Board of Trade Building
Portland 4, Oregon

Pennsylvania State Registration Board for Professional Engineers
Miss Louise J. Franklin, Secretary
570 Education Building
Harrisburg, Pennsylvania

Puerto Rico Board of Examiners of Engineers, Architects and Surveyors
Joaquin Mercado-Cruz, Secretary
P. O. Box 3271
San Juan, Puerto Rico

Rhode Island State Board of Registration for Professional Engineers and Land Surveyors
Philip S. Mancini, Secretary
246 State Office Building
Providence, Rhode Island

South Carolina State Board of Engineering Examiners
Miss Miriam E. Gibbons
Assistant Secretary
P. O. Drawer 1464
Columbia, South Carolina

South Dakota State Board of Engineering and Architectural Examiners
E. D. Dake, Secretary
S. D. School of Mines and Technology
Rapid City, South Dakota

Tennessee State Board of Architectural and Engineering Examiners
William H. Rowan, Secretary-Treasurer
P. O. Box 1819, Station B
Nashville, Tennessee

Texas State Board of Registration for Professional Engineers
Thomas C. Green, Executive Secretary
904 Lavaca St.
Austin 1, Texas

Utah Representative Committee of Professional Engineers and Land Surveyors
Frank E. Lees, Director
318-A State Capitol Building
Salt Lake City, Utah

Vermont State Board of Registration for Professional Engineers
Walter D. Emerson, Secretary
Norwich University
Northfield, Vermont

Virginia State Board for the Examination and Certification of Professional Engineers, Architects and Land Surveyors
Turner N. Burton, Secretary
P. O. Box 1-X
Richmond, Virginia

Washington State Board of Registration for Professional Engineers and Land Surveyors
Edw. C. Dohm, Secretary
Department of Licenses, Professional
Division, General Administration Bldg.
Olympia, Washington

West Virginia State Registration Board for Professional Engineers
Robert Williamson, Jr., Secretary
301 Morrison Building
Charleston, West Virginia

Wisconsin State Registration Board of Architects and Professional Engineers
W. A. Piper, Secretary
1140 State Office Building
Madison 2, Wisconsin

Wyoming State Board of Examining Engineers
Mrs. Wilma H. Lang, Asst. Secretary
201 State Capitol Building
Cheyenne, Wyoming

Here's the Second Part of a Three-Part Series on Engineering as a Profession Written by One of This Country's Most Outspoken Individuals. The AE Has Been Granted Special Permission by Admiral Rickover to Publish His Observations, Which Are "Must" Reading for All.

The Meaning of Your Profession

By
VICE ADMIRAL H. G. RICKOVER
Chief, Naval Reactor's Branch
Division of Reactor Development
U. S. Atomic Energy Commission

Working together on projects is essential for engineers, says the author, just as it is for the doctor or lawyer. However, Admiral Rickover condemns the practice of having a lay administrator supervise these programs.

Part II

PROFESSIONAL persons are a rather troublesome anachronism in organizations although they are indispensable in a technological society. An executive honored by high position and impressive emolument will naturally find it extremely hard to admit—even if only to himself—that in certain matters he knows less than a young engineer to whom he pays but a fraction of what he himself earns. Such dispassionate assessment of one's own limitations is rare and calls for large-mindedness and imagination; for humility in the face of the vast powers with which modern technology deals, and for a great deal more understanding of science than is possessed by most laymen.

Perhaps the present scarcity of outstanding engineers and the keen competition for their services by government, industry and the universities may firm up the status of your profession.

A frank and perceptive editorial in a recent DuPont publication entitled, "The Great Talent Search," remarks wryly that in competing for qualified professional men, business is handicapped since the *only* incentive it has to offer is money whereas professional and academic life provide *many* intangible incentives. It is but a short step from recognition by business that there *are* other than monetary incentives to the realization that it, too, can provide such incentives.

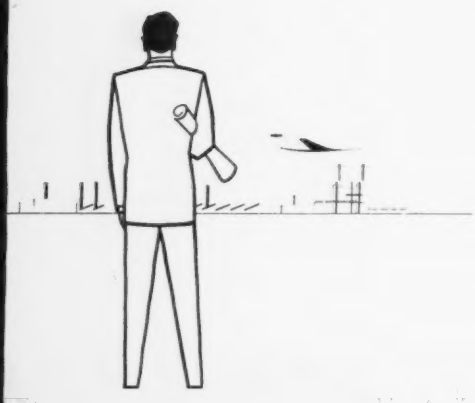
American businessmen are noted for their ingenuity. They could, I am sure, educate their management people to understand that it isn't good business to pay for professional services and then downgrade all one's bright young men to routine technicians. In this connection, it is gratifying to observe the growing practice in industry of engaging engineers to manage engineering projects.

Today, most engineering is done in association with colleagues on joint projects. Supervision of such groups of engineers by a fellow engineer is professionally indispensable. As long as the man who calls

the shots is a colleague, teamwork does not infringe on professional status. This sort of working together is practiced in other professions besides engineering. During surgical operations, for example, one man must be boss and the rest carry out his orders. But you can see what I am driving at if you try to visualize a surgical team working under a lay hospital administrator! Eventually, I hope that the absurdity of putting an engineering team under a lay administrator will become equally obvious to those who run our huge corporate and government complexes. It's like setting a blind man to lead the seeing.

Creating conditions which will attract engineers and stimulate their productivity is important. But productivity is not the sole consideration: safety is even more important. There is great need for awareness in management of the nature of the forces which science and engineering are now harnessing for the benefit of mankind. These forces are far too complex and too hazardous to be manipulated by technological amateurs.

Long ago, a Greek physician sighed: "The life so short, the art so long to learn!" I commend this sentiment to all who supervise complex scientific and engineering projects without themselves possessing professional competence in these matters. It takes a long time and hard study to become a scientist or an engineer. How then can even the ablest executive expect to know and understand the details of technical work? Native wit, talent for leadership, even experience in running large organizations – none of these valuable qualities are substitutes for "the art so long to learn."



PERHAPS as a people we lack respect for the laws of nature and hence for those who know most about these laws. In popular esteem, the manipulator of men outranks the manipulator of abstract laws and facts, and thus we tend to overpay the administrator and underpay the creative professional man. We then compound this error by evaluating the worth of a man's advice by the size of his salary. This lopsided scale of values can stand readjustment. Insistence on professional independence for scientists and engineers may eventually bring this about.

Of course, the professional person's insistence that he cannot accept lay control over the methods he uses to perform his tasks cannot be twisted into an excuse for incompetence or for blunder. To use the example of an operation again: the patient's relatives obviously cannot be permitted to lean over the surgeon's shoulder and direct where and how he is to make his incision. He must be completely independent of lay direction in the *performance* of the operation. However, he will most certainly be judged by the *results* of the operation. If too many of his patients die, the public will render judgment on the surgeon and he will soon have much spare time on his hands.

This distinction between *dictation of method* and *judgment of results* is not always clearly understood, particularly in callings which are still in process of developing into professions but have not yet achieved this status. At this stage, the prerogatives of professional status may loom larger than they actually are—they may even be visualized as a sort of divine right to escape all public censure for error or failure because of the layman's alleged inability to judge professional work. This would be a pretty nice setup if it could be put across to the public, but I am afraid people won't buy it.

Because the individual who seeks a professional service lacks the esoteric knowledge possessed by the man whose help he needs, he finds himself in an inferior position in his dealings with professional persons. Society has sought to offset this by requiring a license to practice and using its licensing power to control educational qualifications of professional people. Professional associations have done much to reinforce this protection of the client by setting up codes of ethics. Besides equalizing the client's position vis-à-vis the professional, these measures also protect the professional person against competition by quacks.

The practice here varies from country to country, depending on the degree of social importance ascribed to any given profession by the public. Thus in continental Europe, the title "engineer" is commonly restricted to persons who have proved their competence to the authorities; in Anglo-Saxon countries it is not so restricted. The professional person's standing in the community depends, in final analysis, on the public's insight of his work, that is, on the educational level of the man in the street. When specialized knowledge of professional people is incomprehensible to the average man, he is apt to flounder between frustrated suspicion and excessive awe, leading him either to interfere unduly with professional independence or to accept naively every claim made by anyone who calls himself a professional. The relation between the expert and the public is one of the central problems of our day.

This problem has been aggravated by a spectacular accumulation of specialized knowledge in

Editor's Note:

Much of the material in this article can be found in the Admiral's latest book entitled *Education and Freedom* published by E. P. Dutton & Co., New York, N. Y., Copyright, 1959. Royalties from the book and payments for speeches and articles are donated by the author to various charitable organizations.

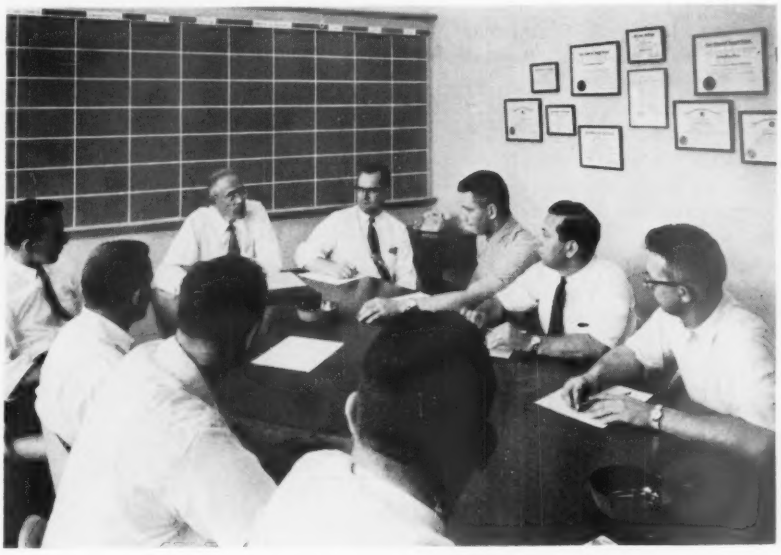
the last four centuries. Since rediscovery of classical thought in the Renaissance, knowledge has been increasing rapidly. In part, this has been a result of the liberation of man's intellect. This has come about through acceptance of Greek intellectual techniques and eventual expansion of these techniques into our modern scientific methods. In part, it has come about simply as a result of the enormous expansion of population, particularly among the people of western civilization who have grown at about double the rate of the world as a whole. Since the people of the West also outdistance all others in scientific productivity, the sum of human knowledge has grown phenomenally. According to available estimates, it now doubles every fifteen years. In contrast, the doubling of population, even in such fast-growing countries as the United States takes forty years at today's rate of increase. The outpourings of this intellectual horn of plenty are overwhelming. No longer can anyone "take all knowledge as his province."

Unfortunately, the average person is touched only obliquely by most of this new knowledge, as when he benefits from some new commodity or service which has grown out of an addition to scientific knowledge. These new things he usually accepts as just another gift from his fairy godmother Science, and he gives little thought to the manner in which they have been brought about: the chain of human effort which began in a remote laboratory where the germinal idea originated; the long process of applied research to verify its practicability; the detailed engineering to transform it into something useful, and the final step taken by industry and commerce to make it available to the consumer.

WHILE the practical results of increased knowledge thus merge into our way of life, the knowledge itself seldom becomes part of our general culture. It remains the possession of small groups of experts, each owning that part which pertains to his specialty. This is so not because the experts are selfishly keeping knowledge to themselves but because most people simply have no taste for knowledge and do not want to spare the time for learning about this potent force in their lives. Thus, we observe a widening gap between the experts and the public who depend for their well-being on the work of these experts. This disturbing cleavage exists in the humanities no less than in science. Thus, most people are not well-informed in such vital matters as the languages and cultures of the various peoples who share this earth with us; the historic, geographic and economic background of current events; the place of American civilization in the estimation of the world, and the real strength of our country in the shifting sands of power relations.

Speaking of the need to improve the physical fitness of our youth, the director of the President's Council on Youth Fitness, aptly described us as a people addicted to "spectatoritis." We have both physical and mental spectatoritis. We sit in the bleachers and let the game of life unfold before us. We accept the delightful rabbits which science keeps pulling out of its magician's hat without bothering to investigate how it is done. We accept our country's power and strength without worrying too much whether as citizens we are always conducting ourselves as the world expects the people of a great nation to act. We gladly accept all the benefits America has to give us but leave to others the responsibilities that go with them. We measure our own personal worth by the number and quality of material possessions we are able to buy, not by what we make of the God-given capabilities with which we were born.

This passive acceptance of life's benefits and unconcern for the great problems of our day could undermine our freedom subtly and almost imperceptibly. As citizens of a democracy, we are all rulers of this country and rulers cannot afford to be ignorant of everything beyond the narrow confines of their own small personal world. This was well understood by the upper and middle classes of past societies who knew that their rule depended upon comprehension of



Here, engineers gather for discussion. Such sessions are necessary in planning any large-scale projects.

the world in which they lived. It was the reason why they made certain that their sons were broadly educated. Intelligence is not the special preserve of any particular class. Learning is hard for everyone. If the middle classes of old were able to push most of their sons through tough schools and universities where they received the liberal education which fits men for leadership, this was not because their sons had superior intellectual capacities but because they were strongly motivated, determined to improve their inherent abilities by training mind and body to their utmost. This motivation came from home and school environments which fostered respect for excellence and emphasized the need of competence in whatever position one occupied in the world. Determination can offset average endowments, but without the desire to improve oneself, the highest native capacities count for little.

Today, most Americans have more leisure than the middle and upper classes had in the past. Our country is rich enough to provide the same tough education for all our children which once only middle class parents required of their sons. But neither our leisure nor the obvious need of democratic citizens to know a great deal more about their world today than they needed to know in a simpler past —neither of these urgent reasons for giving every child a tough education have greatly influenced popular ideas about education. We have adopted middle class standards widely in our manners, our homes, our taste in clothes—in all the externals of life. But we have not as yet adopted traditional middle class standards in regard to education. In fact, Americans were more ambitious to better themselves through improving their minds when we were all poorer: when self-improvement meant going to night school after a long day's hard work. The desire for an education which will really stretch our minds is not yee dead but it is almost smothered by our soft and pleasant life. No longer is our national goal a life of adventure, of risk, of a chance to reach for the stars; instead it is a desire for comfort and security.

A high price must be paid for this comfort and security if the cost is ignorance of the powerful forces which control our destiny. Science is now able to change our environment in ways which have never before been dreamed of. It is disturbing to watch the relentlessly widening gulf which separates the minority who understand and make use of science from the uninformed majority who passively accept whatever comes to them from the hands of the experts. That this gulf has not led to conflict or deep alienation—at least not yet—is due to two phenomena, unique to western civilization: political democracy and professional ethics.

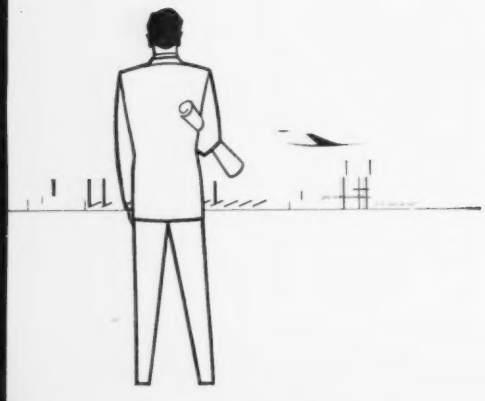
Political democracy vests ultimate power in the average citizen —regardless of his intelligence, education or sense of responsibility; and professional ethics forbids professional men from taking unwarranted advantage of their own superior knowledge. Both of these safeguards we owe to the Greeks. Both were evolved by the Greeks in response to the then prevailing situation where knowledge was concentrated in small groups of experts and spread thinly over the mass of the people. We, today, are faced with somewhat of a similar situation. Let me explain:

At the dawn of western civilization, the general pattern of life in settled communities was one in which a small group, versed in esoteric knowledge, ruled over the rest of the people to whom access to such knowledge was denied. The legends of many peoples reflect the propaganda of the elite that aspiration to knowledge above one's own station is sinful and will call down the wrath of the gods. Practical knowledge of the kind needed by the peasant, the artisan, the shopkeeper – yes, these the masses might learn. But knowledge of law, medicine, theology, astronomy, the ability to read and write and to govern, these were a sort of magic possessed only by the divinely ordained few.

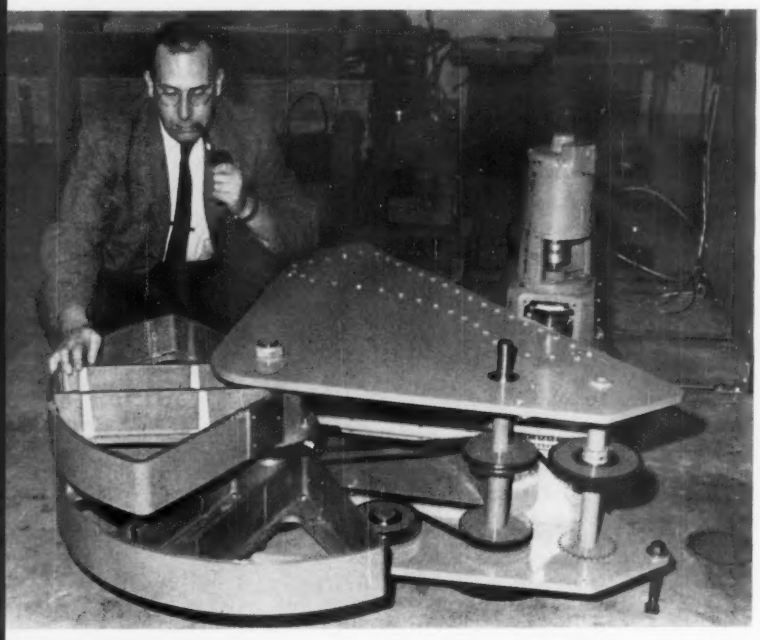
The author in a formal pose.

Guarded jealously and handed down only within the group, this knowledge provided its possessors with power, wealth and comfort. In some parts of the world one can even today find people enslaved to experts who use their special knowledge to enforce subordination to their will—shamans, medicine men and the like.

(To be Continued)



This machine, just completed by Caltech engineers, produces realistic earthquake effects such as cracks and other damage to full-size structures so that 'quake-resistant designs can be developed. Dr. Thomas K. Caughey, associate professor of applied mechanics who is responsible for the machine's electric circuits, is shown examining the chain-driven, counter-rotating arms that carry various weights to produce the desired amount of shaking.



Caltech Builds Earthquake Machine

A MACHINE that manufactures earthquakes has been built by California Institute of Technology engineers to help produce structures that will withstand earth shocks.

By cracking a few real buildings under controlled conditions, Drs. George W. Housner, professor of civil engineering and applied mechanics, and Donald E. Hudson, professor of mechanical engineering, propose to produce information that will make possible practical, economic designs for buildings, dams and bridges that can survive earthquakes without damage.

Because of the wide demand for this information in countries where earthquakes are prevalent, engineers and scientists from Japan, India, Argentina and Chile are at present participating with Housner and Hudson in the project at the Caltech earthquake engineering laboratories in Pasadena.

The building shaking project is sponsored by the Earthquake Engineering Research Institute, a nation-wide nonprofit agency composed of engineers and scientists and headed by Dr. Housner, under a contract with the California State Department of Architecture.

The CSDA's chief concern is with public school buildings. Many of them that do not conform to earthquake codes are still in use in California because school building programs haven't caught up with the population growth.

The shake-making machine is small compared with the formidable 'quake it can produce. It is compact enough to carry through doorways – with help; it weighs about 500 pounds, including its 1½-horsepower motor. The shaking is produced by a pair of 20-inch swing boxes that counter-rotate unbalanced amounts of lead weights horizontally. Up to 400 pounds of the weights can be packed into each box. The boxes swing between heavy triangular steel plates, forty-six inches long by twenty-six inches on the shorter two sides. The 15-inch high assembly is bolted to the floor.

The ability to vary the weights in the boxes and to regulate the speed of the rotations between four and 500 revolutions per minute make it possible to produce 'quakes of varying magnitudes. The direction of the shaking also is controlled. The machines can be used singly or in teams on each floor of a building to produce motions in various phase relations.

By anchoring two of them at opposite corners of the same floor and applying their forces in opposite directions, it is possible to produce torsional twist effects in a structure. Then by "tuning" the machine to the natural vibration frequency of each building, it is possible to cause considerable damage with little energy. This may disclose means of damping these vibrations to reduce damage from this source during earthquakes.

With data produced by the vibrator and some 100 small seismographs that Housner and Hudson are installing in Los Angeles and San Francisco, they hope to develop 'quake-resistant designs for structures and to make possible sound building codes in areas subject to earthquakes.—**End.**

New Literature

STEEL JOISTS—Ceco open-web steel joists, steel roof deck, and Cecor centering, for construction of lightweight, economical, and safe roof and floor systems are fully described in a new

28-page booklet #3001-P. The booklet contains complete descriptions and diagrams of open-web steel joists, including Ceco's Series "S," "L," and "E/C." The booklet also contains information on Ceco's steel roof deck and Cecor centering used as permanent form material for concrete slabs over steel joists or beams. The booklet is complete with tables of available dimensions, allowable loading, complete specifications, and recommended handling and erecting procedures.

(Circle 15 in Readers' Service Dept.)

BUILDING PANELS—Panel Structures, Incorporated has announced its new 1960 catalog featuring the SANPAN translucent building panel. The complete line of SANPAN translucent panels, translucent window walls, and translucent curtain wall systems, are described in detail with full size and scale drawings of all panel types and accessory framing sections. In addition, several major installations of SANPAN featuring colored and multi-colored panels, are illustrated.

(Circle 16 in Readers' Service Dept.)

SKYLIGHTS—The Marco Company has announced the publication of the 1960 issue of its annual catalog containing up-to-date information on the complete line of MARCOLITE aluminum and fiberglass skylight products. This new brochure consolidates the information of all previously issued literature in one booklet. All models and designs are described and two recent major installations are illustrated.

(Circle 17 in Readers' Service Dept.)

EPHEMERIS—The 1960 Gurley Ephemeris is now available to practicing surveyors and engineers and to instructors and students of surveying. Charts showing northern, southern and equatorial stars are included for the first time. These are keyed to tables in the Gurley Ephemeris. The 1960 edition runs to ninety-two pages and also includes bound-in charts for simplifying the computation of Polaris. These charts make it possible to determine Polaris in a bare fraction of the time once required, it is claimed. The annual Gurley publication's Almanac, listing 28 selected stars for determining stellar observations, is an abridgment of the American Nautical Almanac. It gives complete instructions for determining azimuths by methods similar to those used in observations of the sun and Polaris. The twenty-eight stars were selected by cadastral engineers of the Bureau of Land Management, U. S. Department of the Interior. The booklet also contains charts for the sun and Polaris, as well as definitions of astronomical terms and many sample problems.

(Circle 18 in Readers' Service Dept.)

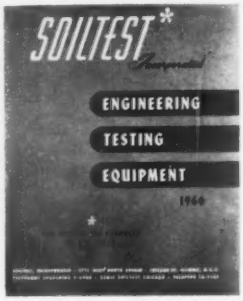
DUCTILE IRON PIPE—James B. Clow & Sons, Inc. have a new booklet, "Clow Ductile Iron Pipe and Fittings," which is designed to be helpful in solving pipe corrosion problems in industries where piping is exposed to extreme chemical and acid conditions. The booklet contains tables which set forth the physical and metallurgical properties of ductile iron pipe, compares its corrosion resistance in various media, gives specifications of Clow ductile iron pipe and fittings with flanged joint, Clow Bell-Tite joint and with plain or threaded ends.

(Circle 19 in Readers' Service Dept.)

GRATINGS—A 16-page catalog issued by Borden Metal Products Company gives emphasis to the three basic grating types used in construction. Includes dimensional drawings of more than thirty grating subtypes; eight safeload tables for steel grating, aluminum grating, roadway grating and sidewalk slabs; plus other tables for panel widths, tread widths, floor armor, etc. Various safety treads and nosings are also shown in the catalog as well as detailed instructions for selecting, specifying and ordering grating.

(Circle 20 in Readers' Service Dept.)

EQUIPMENT—Soiltest, Inc. has just published the largest engineering equipment catalog in the company's 13-year history. Containing 316 pages, almost three times as many as last



year's edition, the new 1960 catalog describes over 3400 different items ranging from a small pocket-sized soil penetrometer to completely equipped mobile laboratories and nuclear testing equipment. The catalog also features approximately 1500 illustrations, with individual sections on equipment for testing soils, concrete, aggregate, and bituminous materials; mobile laboratories; general laboratory equipment, and drilling and sampling equipment. Listings include major equipment and all accessory items. Referenced to ASTM and AASHO specifications, the catalog contains recommended equipment lists for specific types of testing projects.

(Circle 21 in Readers' Service Dept.)

RADIATORS—Contractors who service and maintain their own equipment will be interested in a 32-page booklet just off the press. Entitled "New Blueprint for Profits," the booklet is published by Inland Manufacturing Company. The booklet covers the entire procedure for setting up a radiator servicing department. It shows the latest compact shops, the testing, cleaning, and repairing units—individually and in combination. There is a complete price list and specification chart. In addition, various methods for arranging the necessary equipment are charted. The booklet also describes Inland's methods of financing, etc., which the manufacturer makes available to customers. Inland's factory training school for Radiator Repairing, a course which is provided free for customers, is also described in detail.

(Circle 22 in Readers' Service Dept.)

TEMPERATURE—"A Study of Temperature Uniformity in Heat Treating" is the subject of an 8-page reprint available from Ipsen Industries, Inc., manufacturer of heat treating units and related equipment. The author, H. N. Ipsen, discusses temperature uniformity and furnace design. He describes a series of tests conducted to measure temperature variations within the heating zone when a charge is placed in the furnace and brought up to heat. The series of tests were run at 1550°F., and repeated at 1850°F. The reprint includes graphs that show test results under three conditions: first, with no baffle and no fan; second, without a baffle and with a fan, and third, with baffle and fan. A discussion of controlled forced convection heating and temperature uniformity concludes the article.

(Circle 23 in Readers' Service Dept.)

ALUMINUM—Comprehensive information, compiled to assist architects and others in the selection of aluminum alloys and surface finishes for a vast array of building industry applications, is contained in a colorful new booklet, "Aluminum For Architecture," being offered by the Olin Mathieson Chemical Corporation's Metals Division. The 20-page booklet contains guides to mechanical finishes, with a listing of the designations set up by Olin Aluminum and the counterparts of these established by the National Association of Architectural Metal Manufacturers, as well as descriptions of the various textured, bright or satin surfaces and how they are achieved. Electrochemical and chemical finishes with recommended coatings for varying architectural exposures are listed in the same way. A detailed section on applied finishes—including porcelain enamel, baked enamel and primers—is included. Concise charts list the alloys available and describe the mechanical properties of architectural alloys in the various scales of temper or hardness. A general outline of specifications is presented as a guide for use in specifying architectural aluminum. Also covered are such points as recommended protective measures against electrolytic corrosion, the maintenance of aluminum, and engineering properties of aluminum alloys.

(Circle 24 in Readers' Service Dept.)

ARC WELDING—New products and new engineering data have been added to the most recent edition of Air Reduction Sales Company's "Electrode Pocket Guide" that has just been issued. The 64-page booklet contains

complete information on all types of electrodes available from Airco: mild steel, low alloy, low hydrogen, iron powder, stainless steel, hardfacing, nonferrous and cast iron. Under each electrode listed, a brief description is given together with applications, procedures and pertinent AWS-ASTM data. Two 8-page foldouts at the rear of the book contain charts of recommended Airco electrodes for welding ASTM and trade name steels, and comparison tables for mild steel and hardfacing electrodes of leading manufacturers. The new edition contains a number of important features: an Airco conformance table to government specifications; descriptive write-up of stainless steel iron powder type electrodes; electrode reconditioning guide, and data on new hardfacing electrodes. Electrodes are listed chronologically by AWS classification number.

(Circle 25 in Readers' Service Dept.)

THERMAL INSULATIONS—Thermal insulations for all types of commercial and industrial requirements, in applications ranging from —400°F to 3000°F, are completely described in a 54-page catalog published by Johns-Mansville. Entitled Insulation Product Information (A.I.A. File No. 37-D), it contains six complete sections, each devoted to a specialized group of Johns-Mansville thermal insulations. These include industrial and high temperature; plumbing, heating, and air conditioning; refrigeration; insulating firebrick and refractories; finishes and weatherproofing materials; and miscellaneous insulations, including asbestos papers, millboard, felts, blankets, and similiar products. Individual sections are thumbtabbed for easy reference. Information on each product consists of an application photo, description, available forms or types, advantages to users, and detailed specification data, including compliance with government specifications and ASTM standards. The type of insulation and its temperature limit are prominently displayed for each product to facilitate rapid location of pertinent data. Catalog format throughout has been made as uniform as possible.

(Circle 26 in Readers' Service Dept.)

STEEL EQUIPMENT—A 92-page general catalog (No. 100-H) has just been released by Lyon Metal Products, Inc. The catalog illustrates the complete Lyon line of steel equipment products for business, industry, institutions, homes. It contains product views, complete specifications, and installation views depicting the Lyon products in action. Included in the book are several new products which are illustrated for the first time. Among them are: office machine cabinet; office machine table; typewriter attachment (for Lyon desks); a new drawing table; two new woodworking benches; desk high bookcase; full height bookcase, and a drawer tool stand.

(Circle 27 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in this column, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

Engineer-Architect Disputes Cited in Review of Court Cases

BECAUSE of the continuing interest in matters of engineer-architect relations, and particularly the line of demarcation between the activities of the two professions, the legal staff of NSPE has compiled for the AMERICAN ENGINEER, summaries of leading cases bearing on this issue of engineer-architect disputes, which have gained prominence over the past few years. Some of these summaries follow:

***Connecticut—Douglas v. Smulski*, 131 A.2d 225 (1957) Court of Common Pleas of Hartford County, Connecticut**

Smulski, seeking an architect to design certain buildings, went to Douglas believing him to be an architect. Douglas, however, was a registered professional engineer. The parties then entered into a contract which described them as "owner" and "architect," which was for all intents and purposes a contract for the rendition of architectural services. When Smulski defaulted in payment of the agreed-upon fee, Douglas brought suit. Smulski claimed that since Douglas was not a licensed architect, he could not collect on the contract.

Connecticut law provides that no person shall practice architecture or do anything which would indicate to the public that such person practices architecture unless that person is licensed as an architect. Recognizing that architectural work incidental to engineering work is permitted by a registered professional engineer, the court said that this should not be construed as permitting the engineer to do the entire architectural job. The court further stated: "He seeks to recover on a contract for architectural services rendered in clear violation of the statutes. Such a contract is illegal and void as against public policy."

Since it was the clear intent of both parties to contract for the rendition of architectural services, and since the plaintiff was not a licensed architect, the court declared it "will not lend its aid in support of a contract rendered in violation of a governing statute."

***Michigan—People v. Babcock*, Supreme Court of Michigan (1956)**

Babcock, a registered professional engineer in Michigan, was convicted for unlawfully using the designation, "architectural engineer and builder." The Supreme Court rejected his argument that his engineering license entitled him to use such a designation under the joint engineer-architect engineer law. The court said the joint law stipulates separate examinations for the two fields and provides separate definitions. "In our opinion it was the intention of the legislature to segregate architects, professional engineers and surveyors into three distinguishable categories," the court said.

***Pennsylvania—Conrath v. Delaney*, et al., Common Pleas Court, Erie County, Pa. (1952)**

Suit by a registered engineer for his fee for preparing plans for an addition to a market building. The jury returned a verdict for the engineer, but the defendant asked the court to deny the claim because the services which were rendered were those "which belonged to the field of architecture and not engineering." Judge Laub ruled that the problem is a factual one and that the engineer could not recover if the work was primarily architectural and not engineering. However, noting that the state law contains a provision permitting an engineer to perform architectural work incidental to his engineering work, and vice versa, it was held: "Concededly the two fields overlap to a point where at times the functions of each become almost indistinguishable from the other. The legislature recognized this as fact when, in the licensing act, permission was given to each to do such work belonging to the other which is incidental to the actor's function." A review of the work performed convinced the judge that the work required involved engineering principles and that the architectural aspects were incidental to the engineering functions.

***New Jersey—Reisinger v. Fritelli*, Hudson County District Court (1953)**

Reisinger, a professional engineer, prepared plans and specifications for a garage building and showroom. He found it necessary to sue for his fee and the defense offered that the work was architectural in nature and he was not authorized to practice as an architect.

The court held that the work was architectural and it (the court) was bound by the previous ruling in the *Gionti* case. The court did express the opinion, however, that the situation was far from clear and that it should be straightened out by the legislature.

Strictly Business

Personalities . . . **B. Linn Soule** has been appointed liaison engineer for **Packard-Bell Electronics** in the firm's Dayton, Ohio, office . . . **George P. Ferrigni** has been named assistant manager of the Project Engineering Department of **American Cyanamid Company's** Engineering and Construction Division, New York, N. Y. . . . **Electronic Communications, Inc.,** St. Petersburg, Fla., has announced that **James B. Williams** has accepted the position of vice president-engineering with the company . . . **Sheldon L. Feld** has been named applications engineer at **Yardney Electric Corporation,** New York, N. Y. . . . The appointment of **Hal Shidemantle** as manager of the Engineering Materials Laboratory of the **Mack Trucks** Research Department, Plainfield, N. J., has been announced. . . . The two highest positions in the Office of the President, **Borough of The Bronx** of New York City have been filled recently with the appointment of **Harrison Blankstein** as chief engineer and **Herman Ginsberg** as deputy chief engineer . . . **Henry F. Schoemehl** has been appointed director of engineering of **Hoffman Electronics Corporation's** semiconductor plant, Evanston, Ill.

Mr. Soule

Loren A. Bailey has joined **Page Communications Engineers, Inc.,** Washington, D. C., as a senior staff engineer . . . **E. R. Sternberg** has been appointed chief engineer of White Truck Division, **The White Motor Company,** Cleveland, Ohio . . . The retirement of **John W. Mershon** as chief plant facilities engineer of **The Yale & Towne Manufacturing Company,** New York, N. Y., after forty years of service has been announced . . . **Louis Duman,** president of **Advance Transformer Company,** has announced plans for another addition to the Chicago, Ill., plant to house the company's Star Metal Products Division . . . **Richard H. Merritt** has been named consulting engineer in the Sales Engineering Department of **Norton Company's** Abrasives Division, Worcester, Mass. . . . **Dr. D. B. Steinman,** consulting engineer, has taken into partnership his associates **R. M. Boynton, C. H. Gronquist,** and **J. London.** The firm now operates under the name of **Steinman, Boynton, Gronquist & London, Consulting Engineers,** New York, N. Y. . . . **George L. Bruggemeier** has been named chief engineer for **The Firestone Tire & Rubber Company,** succeeding **W. K. Adkins,** who retired in January after nearly forty-one years with the Akron, Ohio, company.

Mr. Mershon

Dr. David B. Pall, president of the **Pall Corporation,** Glen Cove, N. Y., has announced the appointment of four new engineering posts—**Charles H. Hacker,** chief engineer industrial filters, **Martin Kurz,** manager of porous metals; **Stanley Sakol,** assistant sales manager, and **Morris Sankey,** director of quality control . . . **Dr. Raymond H. Warner, Jr.,** has been named to the position of chief engineer, Diode Development for the Semiconductor Division of **Motorola, Inc.,** Phoenix, Ariz. . . . The appointment of **Louis S. Oosten** as vice president in charge of engineering for **Bell & Gossett Company,** Morton Grove, Ill., has been announced by **R. E. Moore,** president . . . **Carl L. Tucker** has been named chief engineer of **Remington Coporation,** Auburn, N. Y. . . . **Owen L. Taylor** has been promoted to manager of engineering at the Portable Appliance Division, **Westinghouse Manufacturing Company,** Mansfield, Ohio . . . **Martin R. Haley** has been elected president of the **Walter Butler Engineering Company,** consulting engineers of St. Paul, Minn., and Miami, Fla. . . . **Clyde W. Kelley** has retired from **Fenestra, Inc.,** Detroit, Mich., following forty years with the firm. He was director of engineering research.

Dr. Warner

Rear Admiral **Joseph F. Jelley** (U. S. Navy, ret.) has joined **Henningson, Durham & Richardson,** consulting engineers of Omaha, Nebr. . . . The appointments of **Joseph W. Wells** as chief product engineer and **Roland E. Brault** as chief industrial engineer of Wallace Barnes Division, **Associated Spring Corporation,** Bristol, Conn., have been announced . . . **Parker Aircraft Company,** Los Angeles, Calif., has named **William R. Rector** as chief engineer, Hydraulics Division . . . **Paul H. Goodell** has been appointed chief engineer of the Panelbloc Division, **Bettcher Manufacturing Corporation,** Cleveland, Ohio . . . **Hercules Filter Corporation,** Hawthorne, N. J., has announced the appointment of **Earl A. N. Johnson** as its representative in the Pacific Northwest . . . **Richard C. Kasser** has been named manager of design and sales engineering for **Aluminum Company of America's** newly created Aluminum Structural Division, Pittsburgh, Pa. . . . **William C. Pittam,** project engineer for **Stone & Webster Engineering Corporation** in charge of work on expansion of the Georgia-Pacific pulp and paper mill at Toledo, Ore., has been promoted to consulting engineer.

Mr. Rector

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NSPE Board Members to Hold Winter Meeting in Wichita

The National Society holds its winter meeting this month—February 18-20—in Wichita, Kansas, and a topnotch program is in the offing.

In addition to the regular committee reports and other business, NSPE Board members will listen to two well-known speakers. E. R. (Pete) Quesada, administrator of the Federal Aviation Agency, will be the banquet speaker on February 19, while Major General A. M. Minton, director of engineering for the U.S. Air Force, is scheduled to speak the same day at a luncheon.

According to Guy Shelley, Jr., general chairman for the three-day session, many social events have also been arranged to assure an enjoyable time for members and their wives.

As usual, the Society's Executive Committee will convene earlier with all-day meetings planned February 17-18.

Petition Received to Add Dunn as Nominee

A petition signed by fifty-nine NSPE members from Michigan was received at national headquarters in January requesting that the name of Lehmann M. Dunn be included as a vice presidential candidate from the Central Region on the official Society ballot for 1960-61 officers.

The petitioning group—all members of the Michigan SPE—exercised a right as provided in the NSPE constitution which states that additional nominees other than those selected by the national Nominating Committee will be accepted if a petition signed by fifty members is received by January 10.

Mr. Dunn, of Port Huron, Michigan, is head of the Dunn Construction Company in Port Huron, and is also a consultant in marine structures, investigations and structural design. A 1935 civil engineering graduate of the Michigan College of Mining and Technology, Mr. Dunn has been associated with the Corps of Engineers in river and harbor work, and with the Reclamation Department, where he was assigned to Grand Coulee Dam. He has also held positions with Penn Iron Mining Company, and Steinle Wolfe, Inc.

Lehmann M. Dunn

Mr. Dunn served for four years in the Corps of Engineers during World War II, and now holds the reserve rank of lieutenant colonel. A national director of NSPE for two terms, he is a past president of the Blue Water Chapter of the Michigan SPE, a former president of the Michigan SPE, and has served on a number of state society and chapter committees. He has been chairman of the Constitution & By-Laws and National Defense Committees of the NSPE.

He is president-elect of the Port Huron Rotary Club, and is active in Chamber of Commerce, Boy Scout, and Community Chest programs. He is a member of the Governor's Commission (Michigan) to revise the Housing Act.

Arkansas Society Officers

New officers were recently installed by the Arkansas Society of Professional Engineers during their annual meeting. They are, l.-r.: Robert F. Oates, president; John T. Pendergrass, president-elect; B. Allen Curry, vice president; Sanford M. Wilbourn, secretary; John W. Crouse, director, district 2, and Robert H. Boyd, director, district 5. Absent at the time of the photograph was Robert H. Kuhlman, treasurer.

Thoughts on Professionalism...

By PAUL H. ROBBINS, P.E.

NSPE Executive Director

What Are You Telling Young People?

- Is there really a shortage of engineers?
- What do engineers really do?
- How much do they earn?
- Are we going to continue to need many engineers?
- Is not a career in science better for a young person than engineering in this day and age?

How do you answer these questions? Do you have authoritative statistics from which the young person may make his own judgments on the question? Do you point out that the real shortage exists in those with much more than a four-year college education? Do you point out that unless the individual has a real aptitude in science and math and an interest in engineering he might be better advised to enter the equally-demanding and extensively-needed area of technician training?

Are you familiar with the work done by engineers in branches or types of employment other than your own? Do you have the latest NSPE survey of earnings of engineers, and have you kept abreast of recent reports of starting salaries for young college graduates? Have you given thought to and can you present a brief outline of technological demands of our expanding economy and extremely complex technological defense effort coupled with space exploration, and the world-wide needs for providing food, clothing and shelter for underprivileged nations? Can you give a clear delineation between careers in pure science and those in engineering—the merits of each and the fact that so much of our current scientific effort is actually engineering effort?

Many members of the engineering profession will have questions like this posed to them either in talking with children of their own or friends, or as they appear as a part of an organized program of vocational guidance in junior and senior high schools. These questions, of course, are not being posed only by young people looking at engineering as a potential career. They are also serious questions being discussed in engineering and science circles and in high levels of government and education.

Fortunately, through the coordinating efforts of the Engineers' Council for Professional Development and the grass-roots assistance of local chapters of NSPE, engineers are having an opportunity to give firsthand answers to these questions to many inquiring young minds. But the welfare of our nation and the good of the engineering profession require not that answers be given in terms of personal experience or individual impressions alone but from a broad and understanding knowledge of the engineering profession, of the requirements, obligations and opportunities of the future, and the technological needs of our nation.

Members of the profession who are called upon to assist in this very worthwhile vocational guidance work should make every effort to inform themselves as well as possible on the many aspects of the engineering and scientific requirements of the nation in order that they may advise as fully and factually as possible those upon whose shoulders these engineering and scientific responsibilities will fall in the future.

A $500 scholarship was recently awarded to Raymond V. McClure, center, by the Nassau County Chapter of the New York State SPE. Clifford Dvorak, president of the Chapter, is shown at the right presenting the award, while Prof. Milton Alpern, chairman of the Education Committee, looks on. The presentation was made at a special dinner honoring nineteen award winners and their parents.

California Chapters Meet; Robbins Speaks

The second annual Bay Area chapters meeting was recently held in Berkeley, California, with NSPE Executive Director Paul H. Robbins as the guest speaker.

Among the guests present was Kiel Hahm, a registered civil engineer from South Korea, who came as a guest of the Contra Costa Chapter to observe the meeting. Mr. Hahm is in this country under the auspices of the United Nations Technical Assistance Operation to tour the U.S. for his government and to study American railway engineering practices. (See photo below.)

At California Meeting

Paul H. Robbins, right, NSPE executive director, is shown shaking hands with Kiel Hahm, a South Korean engineer, during a recent meeting of California chapters.

LETTERS

(Continued from page 6)

Claimed" (AE, Nov., 1959) and wish now to air some views I have formed over the last few years:

1. Money being easy to come by there are many people, professional and otherwise, who feel they don't have to work for it. This may be because they have a degree but we know in this day of specialization, the learning encompassed in one degree is not sufficient.

2. Undoubtedly there are the personality problems in an organization which prevent objectivity. Administrative duties prevent study of newness. Poor communications may mean lost time in order to back track and bring everyone else abreast of the problem, projects, etc.

3. Summing up, there are too few really good engineers around in any field. These deserve the money but they are often held back by being shackled to the majority, and management does not or cannot set precedents. More careful selection of duties very often puts very good people with engineering backgrounds in the administrative jobs and leaves the competent engineer in strictly engineering work. Recognition in the big companies could start by turning the patents that the man develops over to him letting him set the terms. Any argument on this point indicates the desire to ignore the points above.

For those who feel there is no hope while serving as an employee perhaps the following action offers the solution: Form your own company as this writer did over a year ago. At 32 years of age and heading a small corporation, I work 12 hours a day with engineers and technicians manufacturing reinforced plastic constructions. There is the satisfaction in knowing you can hire and fire and pay at will. (Closing the discussion now to meet with union organizer.)

(Name withheld by request)

Enjoyed Article . . .

Dear Editor,

I greatly enjoyed reading the first installment of Admiral Rickover's article, "The Meaning of Your Profession."

The AMERICAN ENGINEER is certainly taking a big step forward by having such men as Admiral Rickover among its contributors. While I'm not always in agreement with him, the admiral has made us all do some very necessary thinking. I'm looking forward to reading the next two installments.

P. K. J.
New York, N. Y.

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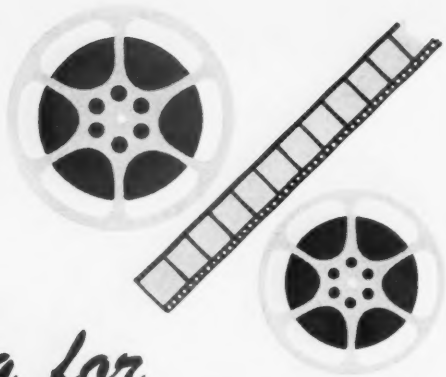

"Building for Professional Growth"

Here is a film covering the activities of the National Society of Professional Engineers at the chapter, state, and national levels. A milestone in the NSPE public relations program, "Building for Professional Growth" is a filmed presentation on the values and benefits of Society membership. Activities covered in the film include NSPE efforts in registration; research projects such as the Income and Salary Survey, the Professional Engineers Conference Board for Industry reports; legislative cooperation; National Engineers' Week, and other programs. Also included are scenes from actual chapter, state, and national level meetings.

"Building for Professional Growth" can be shown on any 16mm sound projector. Reservation requests should be made for three choices of dates. Notification of available date will be sent from NSPE headquarters immediately after each reservation request is received.

RENTAL FEE: $10

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By Mrs. Garvin H. Dyer, Chairman of the Ladies Auxiliary Advisory Committee.

News reaches us from three auxiliaries in Louisiana. Baton Rouge held a Founder's Day Tea in November. Special guests were sixty ladies who were named to membership at a recent meeting.

The New Orleans Auxiliary gave a style show and luncheon recently. There were numerous guests from other Louisiana chapters present.

The Shreveport Chapter Auxiliary has had a brunch at East Ridge Country Club. They are planning a bridge-luncheon in February to raise money for scholarships. Last fall they gave two $100 scholarships to engineering students at Louisiana Tech at Ruston, La.

The Mercer, N. J., Auxiliary celebrated its fifth anniversary with a covered dish supper at the home of Mrs. Ralph Palazzo. Guests of honor for the evening included the past presidents of the group.

The Pittsburgh, Penna., Auxiliary were hostesses at the fall NSPE Board meeting in Pittsburgh. Especially interesting and entertaining programs were arranged for the visiting ladies. This Auxiliary annually presents a $500 scholarship, alternating between the University of Pittsburgh and Carnegie Institute of Technology. The money is raised by giving bridge parties.

The Auxiliary to the Central Chapter of Arizona report plans for their philanthropy, which is in aiding their men's group with its Student Loan Fund. Last spring

they were able to present the Chapter $180 and they hope to increase it this year.

The Blue Water Auxiliary of Michigan held their first meeting in September, at the Black River Country Club. They have four regular meetings a year at which they have dinner with the men's group, but hold the business meeting separately.

The Southwest Idaho Auxiliary report a successful plan of alternating their meeting between potluck luncheons and evening meetings. This year they sponsored a white elephant auction to raise funds for playground equipment for the Ann Morrison Memorial Park. This Auxiliary provided entertainment for visiting ladies at the annual State convention. In December they held a Christmas dinner-dance honoring their husbands.

The Central Illinois Auxiliary enthusiastically report a very exciting program schedule for the entire year, geared to an engineer's wife's interests, which includes hobbies, decorating, culinary art and several social events, ending the year with a friendship breakfast at which time new officers were installed.

Recognition Dinner in Illinois

As their first independent recognition dinner for newly registered engineers in the area, the Joliet Chapter of the Illinois SPE combined it with their annual ladies' night. The guest speaker was Philip Hutchison, legal advisor to the Department of Registration and Education, who spoke on "Prophesy and Appraisals of Professional Engineers." Those honored were P.E.'s James H. Rowell and Alan Freeburg, and E.I.T.'s Donald C. Morgan, Herbert F. Nelson, Donald L. Vercelote, Richard B. Spangler, and Ralph Yunker. Shown seated are, l.-r.: Mrs. James H. Rowell, Mrs. Steward C. Hutchison, and Mrs. Alan Freeburg; standing: Mr. Rowell, Mr. Hutchison (guest speaker), Probate Judge Steward C. Hutchison, and Mr. Freeburg.

Young Engineers Plan Program

Young engineers of the Western Chapter of the Missouri SPE recently presented a panel discussion program entitled "Missing Links Between College and Profession." Participating in the program were, l.-r.: Bert Runge, research; Paul Gualtiere, consultant; Keith Edwards, moderator; Bill Page, sales; Dan Cain, industrial, and John Wright, utilities. Each engineer represented one of the various branches in the discussion. Also during the meeting, the Chapter presented an outstanding service certificate to A. N. Brunson, former editor of *The Missouri Western Engineer* for his service to the profession.

AE NSPE Dates to Remember

Idaho Society of Professional Engineers—Annual Meeting, February 4-6, 1960, Boise Hotel, Boise, Idaho.

National Society of Professional Engineers—Winter Meeting, February 18-20, 1960, Broadview Hotel, Wichita, Kansas.

Kansas Engineering Society—Anual Meeting, February 18-20, 1960, Broadview Hotel, Wichita, Kansas.

Iowa Engineering Society—Annual Meeting, February 22-24, 1960, Fort Des Moines, Des Moines, Iowa.

Minnesota Society of Professional Engineers—Annual Meeting, February 24-26, 1960, Hotel St. Paul, St. Paul, Minnesota.

New Mexico Society of Professional Engineers—Annual Meeting, February 26-27, 1960, Roswell, New Mexico.

Tennessee Society of Professional Engineers—Annual Meeting, February 26-27, 1960, Kingsport Inn, Kingsport, Tennessee.

Ohio Society of Professional Engineers—Annual Meeting, March 24-26, 1960, Netherland Hilton Hotel, Cincinnati, Ohio.

NSPE State Presidents' Conference—April 7-9, 1960, Memorial Union, Purdue University, Lafayette, Indiana.

National Society of Professional Engineers—Annual Meeting, June 8-11, 1960, Statler Hotel, Boston, Massachusetts.

Promotional Aids for

NATIONAL ENGINEERS' WEEK

HERE ARE the basic promotional aids on which to build your Engineers' Week program. These items will give your program coverage in local newspapers, on radio and TV stations, and in civic and group displays. Use these promotional materials to show how engineering progress will affect the decade of the 1960's.

1 ***TV Spot Films:*** A set of three 1-minute and two 20-second TV films dramatizing the theme of the 1960 National Engineers' Week. Produced to meet network standards, the films call attention to the role of the engineer in building for progress through the coming decade. Each film qualified for public service TV time during station breaks. A set of these five films will reach your largest Engineers' Week audience. Price: Set of five films, $25.

2 ***"Engineering's Great Challenge—The 1960's:"*** A 15-minute tape recorded radio program dramatizing the contributions engineering will make during the 1960's. Network performers describe engineering achievements in exploring the moon, in building computers, in medical research, in designing new transportation arteries, in structures, and in many other fields. Excellent for use on public service radio time. Price: $6 each.

3 ***Set of Seven TV Slides:*** Obtain extensive TV coverage through the Week with these slides displaying poster-type art work and printed copy calling attention to engineering. May be used during all TV station breaks as public service announcements. Price: $10 per set of 7 slides.

4 ***Tape Recorded Radio Announcements:*** A set of seven 20-second radio spot announcements, made by a network radio and TV announcer. Offers local stations a top-level recording for 20-second station breaks. Price: Set of seven recorded announcements, $3.50.

5 ***Lapel Buttons:*** A high-quality lapel badge with poster design. Each chapter or state society can set its own price for button sales. Prices: 100 to 500—15c each; 500 to 1,000—10c; 1,000 to 3,000—7c; 3,000 to 5,000—5c; and over 5,000—4c.

6 ***Posters:*** Colorful 9 x 11-inch pasteboard posters carrying the 1960 Engineers' Week design and theme. This is the basic promotional item for calling attention to the Week. Use on bulletin boards, in window displays, school exhibits, etc. Large size (18 x 22 inches) also available. Prices: 9 x 11, $4 per 100; 18 x 22, $5 per 100.

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C. L. Willibald Trinks, teacher and engineering manager and consultant for almost sixty years, has been named "Man-of-the-Year" in engineering in Pittsburgh, Pa. He was honored with fifteen other

C. L. W. Trinks

special award winners at the twentieth annual Pittsburgh Junior Chamber of Commerce "Man of the Year" Dinner in January.

The winners, selected by a committee of twenty-seven prominent citizens, have been selected as the most outstanding contributors to Pittsburgh's industrial and civic progress, and to their representative fields of interest in the past year.

In 1940, Professor Trinks started an organization known as Associated Engineers. At eighty-five, he is still active in the firm.

After several engineering posts, Mr. Trinks in 1902 became chief engineer of the William Tod Company, of Youngtown, Ohio. In 1905, he was appointed by the Carnegie Technical Schools to the position of professor of mechanical engineering and head of that department. He held that position for thirty-seven years. In addition to teaching in day and evening school, Professor Trinks did a great deal of research and consulting work. He has served as a consultant for more than 100 concerns, including Mesta Machine Company, Jones and Laughlin Steel Corp., and Libbey-Owen-Ford Glass Co.

Among the numerous books authored by Professor Trinks is a volume on industrial furnaces, published in 1922, followed by a second volume in 1925.

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Large association in Washington has need for an engineer on its expanding staff. Person should be free to travel at least half time to work with local affiliates. Work will involve promotion, organization, speaking, trouble shooting and development of promotional literature. Salary dependent upon qualifications. Applicants please give age, education, experience, and salary expected. Reply Box 102, AMERICAN ENGINEER.

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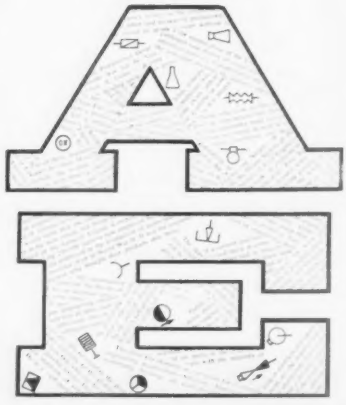

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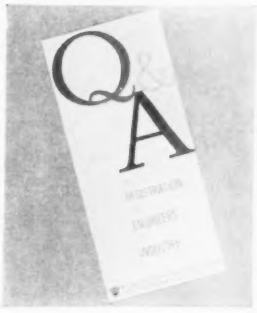

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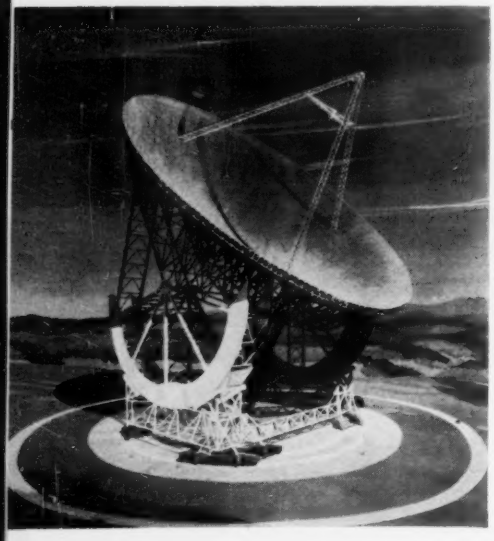
The extent of miniaturization in electronics is suggested by this General Electric technician who must use a high power microscope to build tunnel diode samples.

(Continued from page 26)

ing of new computers, the organizing efforts of the systems engineers will be felt in putting the existing computers to work for business, industry, research, and government. A preview of this activity during the next few years is offered by the utilization of nets of large computers such as the American Airlines SABRE reservations system connecting 1,100 cities, and North American Aviation's computer microwave hookup of a group of IBM units for integrated information processing. Systems engineering is thus becoming intimately involved in constructing the framework within which the large-scale commercial or industrial operation of the future must function in order to cope with the reality situations brought about by global networks of inventory objects and employees, and rapid changes in technology.

As computer technology gets into the utilization of kilo-megacycle components with a probable performance speed of something near a billion logical operations per second, it is not surprising to find a movement underway to devise a common language for "communicating" with these electronic creatures. The new decade is opening with agreements in scientific fields on a computer language called Algol. The U.S. and Britain are adopting a commercial computer language. The realization of the potential of computers and data processing machines is only now beginning to seep out from the laboratories and research centers as the units get closer to actual "thinking" types of performance. Instantaneous language translation, information retrieval, and an interesting assortment of other intellectually advanced activities are definitely assignments to which the computers will be put in the near future.



Civil, structural, electronic, and other engineers produced the design for the world's largest radio telescope at Sugar Grove, W. Va. The device will be used for basic research in probing radiation sources billions of light years from earth.

Structures

The 1960's will see the completion of the first intercontinental bridge as the Bosporus is spanned at Istanbul, joining Europe and Asia with 3,100 feet of steel and concrete. Other record-breaking spans will be designed and constructed during the decade in a more or less frantic attempt to cope with the surging increase in motor vehicles in all parts of the world. Traffic control, throughways, and regional planning will provide the central area of challenge for engineering design in the coming years. In this community planning type of work, the civil engineer must be prepared to broaden his professional horizons so as to include an increased understanding of metropolitan problems relating to industry location, school and recreation sites, traffic flow, urban renewal, and the like.

The impact of technological progress in nucleonics and electronics in industry will serve to challenge civil, mechanical, and electrical engineering design and planning. The enormous missile testing and launching facilities now in operation can be taken as predictive of the large construction job of the future. The civil engineer must meet these space-age challenges by enlarging his prolessional skills in the direction of computer use, automation, quality control, and safety.

Chemistry

In recent years it has often been observed that the boundaries between the separate scientific disciplines were blurring as chemists, physicists, biologists, and the other research specialists were finding their fields coming closer together. The engineering profession has shared in this general trend, and

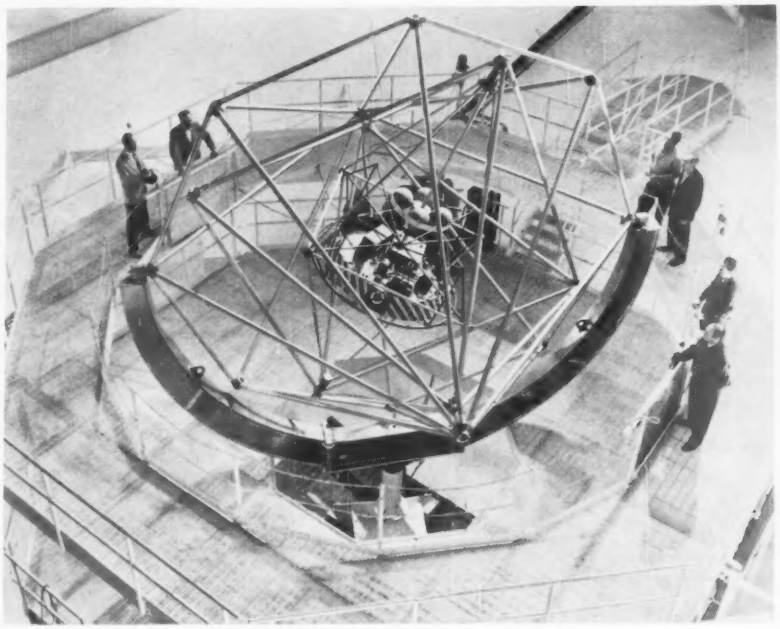
the world of chemistry finds engineers increasingly involved in instrumentation, nucleonics, semiconductors, and many other areas which were barely getting underway at the beginning of the 1950's. By the end of the decade, several large firms had installed computer control equipment for chemical processes. Automation in chemistry will be the pattern for the 1960's as engineers attack the problem of translating laboratory syntheses into industrial and commercial reality. Utilizing computer control and automated techniques for the production of standard chemical items —including medical products such as antibiotics, transquilizers, hormones, and vitamins—will likewise challenge chemical engineering through the next ten years.

One small facet of this engineering challenge regarding costs in chemistry is exemplified in the current search for an effective oral contraceptive as an aid to help contain the so-called world population explosion. Two of these substances, Norlutin and Enovid, are being widely tested. Cost of a month's supply: about $11, far out of the reach of the masses of low income families in Asia who are most affected by an unfavorable balance between population and natural resources.

The burgeoning field of plastics is one of the more striking examples of how chemistry and chemical engineering are expanding our horizons in materials and structures. Polyester resins are a case in point. Born in the fifties, they have climbed to a total production of 160 million pounds in 1959. Industry estimates predict a yearly production of 250 million pounds by 1965. Engineering applications during the 1960's should shape the unsaturated reinforced polyesters into some of our most important fabricating substances.

Space Exploration

At some time in the early 1960's, human beings will climb into a rocket vehicle and be launched into an orbit around the Planet Earth. "Soft" landings of instrumented lunar stations will also soon be achieved, and not long after this should come landings by robot vehicles able to carry out programs of exploration and data gathering. Such programs would be worked out on magnetic tapes, and would send the vehicles scurrying across the lunar terrain to gather information on the composition of the "moon ground." These milestones in technological progress will be followed in a few years by a manned landing on the surface of the moon. The massive engineering effort which will make this lunar expedition possible will have to encompass the rocket vehicle, the communication and navigation instruments, the plans and techniques for making a landing on the moon, the protective clothing to be worn by the lunar explorers and the shelters from which they will operate, the vehicles which will transport the explorers over the moon's surface, the instruments for performing experiments and gathering scientific data, the devices for collecting rock and other samples, and, finally, the take-off from the moon and the return to earth.



Engineering in the 1960's will have an active role in the exploration of our solar system. The flight simulator above makes it possible to perform all the maneuvers which the Mercury space capsule will perform between the time it leaves the Atlas booster to its re-entry into the atmosphere.

There is currently no known factor which would make it theoretically impossible for man to reach the moon and return. The history of man's technological progress is such that what is not impossible is eventually accomplished. Engineers will build the great moon rocket in the near future, and the earth's natural satellite will become an outpost for astronomical and other space studies, and a staging area for round trips to Mars, Venus, Jupiter, and whatever other worlds we can discover.

In the development of space technology, the engineering profession in this country faces a challenge which, in many ways, is nothing less than national survival. We must plan, design, and construct adequate vehicles and instruments to move out into space. We must do these things because of military, technological, and scientific considerations. The 1960's may well be our last chance to achieve national superiority in the

The engineering backgrounds of the seven Project Mercury astronauts point to the kind of individuals who will make up the first space crews. Each of the astronauts has had extensive education and training in engineering.

drive for the exploration of the space outside the atmosphere of this planet.

Basic Research

Basic research in the physical sciences is becoming inseparable from engineering technology. The era of great scientific discoveries made by individuals in basement laboratories is rapidly fading from view. The big steps forward are being made in the large-scale research programs utilizing particle accelerators, radio telescopes, nuclear reactors, low temperature facilities, and space satellites. In the 1960's, basic research in the fundamental nature of matter will be centered around such things as the twenty-five billion electron-volt accelerators at Brookhaven, N.Y., Geneva, and inside the Soviet Union. These monster laboratories are not only engineering marvels in terms of complex electronic equipment, but are also feats in civil and structural engineering. Designed by engineers using the relativistic equations of Einstein, these accelerators exemplify the scope of what has to be done in over-all technology in order to broaden our grasp of the identity and behavior of the some thirty elementary particles which have been found lurking in the nucleus of the atom so far.

To help push our horizons outward during the coming decade, astronomers will have at their disposal a radio telescope with a diameter of 600 feet. With a circumference of nearly a third of a mile, this mammoth instrument made up of 20,000 tons of steel and 600 tons of aluminum will tune in on radio waves which have their origin billions of light years out in space. Before this U.S. Naval telescope in West Virginia is operating, engineers will already be working on the design of a 1,000-foot radio telescope to be built in Puerto Rico.

The listing of engineering involvements in basic research could be extended on and on. Cryogenics engineering, for example, has brought the impact of ultra-cold temperature research to work in missiles, computers, communications, steel, cattle breeding, and biochemistry. With metals becoming super conductors having virtually no electrical resistance at temperatures near absolute zero, physicists look to cryogenics to provide a variety of research tools.

The challenges of basic research in the 1960's are, in large part, engineering challenges. It should be a great decade if the profession meets these challenges as it has shown itself able to do in the past. **—End.**

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RECESSION

(Continued from page 34)

Corporation, described the efforts of his company to help relocate its laid-off personnel this way:

". . . Every effort was made, but the greater Milwaukee area was a difficult place to find openings, as most other major industries were also laying off. However approximately fifteen of these men were accepted by job-shop and consulting organizations who had assignments from without the Milwaukee area. Six other men accepted positions outside of Milwaukee and the remainder chose to do various other jobs, go to school, run their own business while on layoff. . . . We conducted the program through phone calls from our personnel office to the various personnel offices of other companies in the area, and through the Wisconsin State Employment Service."

Salary reductions apparently were not widespread, but many companies, including a number who reported no layoffs, did eliminate or curtail their budgets for merit pay increases during the duration of the recession. In some cases promotions apparently were slowed.

Here are some random comments from companies who reported changes in pay policies.

"None faced salary reduction . . . there was a moratorium on salary increases for about four months of this period . . . promotions were not frozen."

"Promotional increases were given . . . however, merit budget was curtailed."

"The direct economic effects on the engineers were no different from any other employees. There were no salary reductions, but all salaries were frozen for approximately 18 months."

"There was some slowing down of merit increases."

"Normal review period extended."

"Whereas pay increases and promotions were not cancelled, they were not carried on the same scale as in fatter years."

"Promotions were slowed down

(Please turn the page)

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except in certain specialized areas."

"Normal pay increases were cancelled for a six-month period."

These comments, of course, are drawn from firms which reported they were affected by the recession. As noted earlier fifty-four firms reported no changes in salary policies.

In addition to contacting individual industries, the AMERICAN ENGINEER also asked for comments from the various state employment and labor offices in selected areas of the country. Like the companies, the employment offices reported varied experiences with some states apparently hard hit by the recession while others reported little change in the demand for engineering and scientific personnel.

CALIFORNIA, which has a high percentage of defense industry, reported that engineer openings listed for statewide clearance dropped from 596 to 353 between January and June, 1958. In January of 1958, engineer registrations totaled 1,600 in California employment offices. A month later the count had risen to 2,527.

Donald G. Taggart, information officer for the California Department of Employment, summarized the recession period in his state in this manner:

> "Employment conditions were characterized by a substantial number of engineers seeking work while nationally there was still a substantial demand. Specialized experience on the part of applicants with other types of specifications being required by employers, plus the fact that engineers were often not in the right places, seemed to prevent buyers and sellers from getting together. . . . A rather clear picture of the 1958 situation was given in the resumes of a few higher paid applicants. They had worked as technical engineers, then took positions in sales engineering at higher pay, and subsequently were laid off when there was no need for their services in selling technical equipment. . . ."

In the Midwest, 1958 reports from two industrial centers of Indiana—South Bend, and Indianapolis—are revealing:

Indianapolis reported twenty-two mechanical engineers registered for work and one job opening; eleven industrial, six electrical and four chemical engineers were registered and there was one job opening on hand for each classification. No job openings were available for five aeronautical and one metallurgical engineer. Civil engineers were more in demand with two openings and six applicants. Most of the available applicants were laid off from major firms in the automotive, aircraft, non-electrical and electrical machinery industries. Easing of demand for engineers in these industries had begun as early as May, 1957, with curtailment of development programs and lack of orders, governmental and private. . . .

The South Bend report of July, 1958, showed nineteen mechanical engineers registered, a figure which the Indiana Employment Security Division said was unusually high. One large firm in South Bend which normally had a number of electronic engineer jobs open, reduced its standing order with the local employment office to two. Another major firm hired no college graduates in 1958, contrary to normal practice, the Indiana office reported.

W. F. Lunsford, director of the Ohio State Employment Service, told the AMERICAN ENGINEER that about 800 applications from engineering personnel were filed with the Cleveland office during the 1958 recession. At the time, Mr. Lunsford reported, very few jobs were available in the Cleveland area and employers were highly selective, demanding young men with specialized experience in limited fields. Many Cleveland engineers left the area to find employment, Mr. Lunsford reported.

In Columbus, the loss of a government contract forced the layoff of 500 engineers and draftsmen. Mr. Lunsford said most of the qualified engineers secured new employment, but that in many cases junior engineers took local drafting jobs at reduced wages and

(Please turn the page)

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some turned to sales or related work.

Frank T. Judge, director of the New Jersey Division of Employment Security, said cutbacks in government spending and reduced demand for consumer goods caused the layoff of a number of professional engineers and scientists in his state. At the end of January, 1958, 666 engineers and physical scientists were actively seeking assistance of the employment office in finding new jobs.

These are just four random states where the recession appeared to have had effect on the employment status of engineers. As noted in the survey of major market areas on pages 31 and 32 there were many other spots where the demand dipped sharply. At the same time there were a number of states which reported no significant change in the employment conditions of engineering and scientific personnel.

It is obvious then that the recession was spotty for the engineer the same as it was for other segments of the work force. In one area there might have been a surplus of engineering personnel while another area, little affected by the recession, was still faced with a shortage of engineers. Several of the state employment officials surveyed noted that there were surplus pockets of engineers in their areas while there was still a good demand in many fields across the nation.

Certainly, there was nothing resembling the soup-line depression of the 1930's for the engineer of the 1957-1958 recession. In many cases, an engineer was no sooner laid off before he was faced with three or four new lucrative offers. Some times this required a relocation or possibly a shifting to new duties, but this did not always create too big a problem. For the majority of engineers the recession remained something they read about in the newspapers.

But, there is no escaping the fact that the country did have a recession in 1957 and 1958 and that the professional engineer was part of it. Thirty-three firms – more than a third – of those answering the AMERICAN ENGINEER survey reported either layoffs or a curtail-

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(Continued from previous page)

ment in merit raises (in some cases raises were deferred or more carefully scrutinized) or a slowdown in promotions and pay increases. Recruitment of new engineers was obviously down. While shortages existed in some fields, the total demand for engineers was down and the number of applicants for engineering jobs, even though many were short-term applicants, was up sharply during the recession period.

The experiences of this short-lived recession seem to indicate that the demand for engineers follows closely the business curve. In times of high consumer buying and heavy defense spending, the engineer is much in demand in nearly all fields. When the general business market contracts and defense outlays diminish, less jobs are available for engineers and the supply-demand ratio becomes closely balanced.—**End.**

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Portland Cement Assoc. 7
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Scherr-Tumico Co. 10
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Warren-Knight 11
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Progress in Products

SEISMOGRAPH — Item 30

Reliable cost estimates without costly drilling are made available to design engineers, architects, and contractors obtaining subsurface information with a miniature engineering seismograph. Manufactured by Geophysical Specialities Company, the patented 16-pound electronic instrument provides complete information for precisely determining depth to bedrock, the presence or absence of bedrock or other solid materials, and accurate identification of subsurface materials, it is claimed. Operation of the instrument requires only two men and can be handled on foot in any type of terrain. In using the machine, seismic impulses are produced by a sledge hammer.

STRADDLE CARRIER — Item 31

A medium-capacity Straddle Truck carrier has been introduced by Hyster Company, offering increased maneuverability and performance for the handling of loads up to 20,000 pounds. Designated the M200E, the new Hyster straddle carrier is a companion machine to the 30,000-pound Hyster M300E. The 20,000-pound Straddle Truck carrier shares many components with the heavier model, including power plant, drive train and hoist system. Shorter turning radius and higher top speed are big features of the new carrier, Hyster asserts. Four-wheel, power steering provides maneuverability for close-quarter operations.

PROCESSING — Item 32

Engineering and scientific organizations can now rent time by-the-hour on powerful International Business Machines Corporation 709 computers at Datacenters in midtown New York and Poughkeepsie, N. Y. The more than $2,500,000 large-scale 709 system offers rapid, low-cost processing of scientific as well as business data. IBM points out that the 709's immense speed and flexibility make it an excellent system for studies of scientific management and operations research problems. These characteristics, they claim, make it ideally suited to the specific needs of scientific and engineering firms as well as research groups working on such diverse problems as bridge specifications. Arithmetical operations are performed by the IBM 709 at very high speeds. The system can handle up to 42,000 additions or subtractions a second; multiplications or divisions are performed at speeds of up to 5,000 a second.

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ROOF COATING — Item 33

A new aluminum roof coating that's said to improve with age has been developed by Allied Chemical's Barrett Division. Tests show that this new aluminum coating becomes brighter with the passing of time, according to the manufacturer. Under ideal conditions this coating will reflect back better than seventy per cent of the sun's rays, thereby cutting down sharply on the amount of sun heat that is absorbed by the roof and transmitted to space underneath.

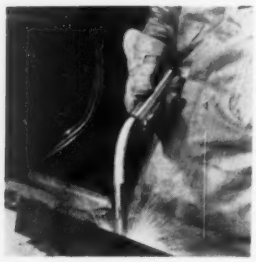
'INSTANT PIPE' — Item 34

Construction machinery that builds "instant concrete pipe" in a freshly-cut ditch at a rate of eight to twelve feet a minute has been developed by Fullerform Continuous Pipe Corp. The equipment is said to eliminate joints and seams and cuts construction time and over-all costs. Inflatable rubber and fabric forms, designed by Goodyear Aircraft Corporation engineers from blimp-type materials, are part of the continuous-operation system. Using two 300-foot inflated forms with only three pounds per square inch of air pressure, as much as 600 feet of concrete pipe can be poured at a time without interruption. It is possible to line up forms for runs in miles. Ready-mix concrete trucks are used in a continuous stream to service the pouring equipment.

INSULATING MATERIAL — Item 35

An inorganic insulating sheet material that combines lightweight and structural strength, has been announced by Union Asbestos & Rubber Company, Fibrous Products Division. Known as Unarcoboard, the 100 per cent incombustible board can be used for ovens, ceilings, partitions, back-up-board for pre-laid tile or brick facing, duct work, firewalls, fireproofing structural steel, heat screens, housings and breechings, and high temperature test chambers. Available in sheets up to 1' x 8' in size, the white board can be installed rapidly and economically.

WELDING GUN — Item 36



A new manual Aircomatic (Air Reduction's gas-shielded metal-arc process) welding gun for use on mild steel using carbon dioxide (CO_2) as a shielding gas has just been placed on the market by Air Reduction Sales Company. The air-cooled gun, designated Model AH60-B, has a continuous duty rating of 600 amperes DC when using "buried arc" CO_2 techniques. It can accommodate hard welding wires ranging from .035" through 3/32" fed from conventional Airco wire feeders.

COATING — Item 37

A water-like fluid that possesses the unique property of making a smooth paint surface so slick that dust and dirt cannot cling to it has been successfully field tested for industrial maintenance says the Du Pont Finishes Division. Secret of the new coating is that the microscopic pores of a seemingly already smooth surface are filled to produce a slickness so total that there is virtually nothing for dirt to adhere to."

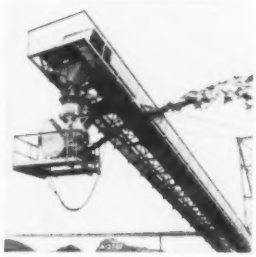
DETAILED MAPS — Item 38

New three-dimensional views of the world and United States—showing the shape of the land as it really is—are being published by Aero Service Corporation. Both of the 28" x 18" plastic maps, the first to be produced in this size, show mountains and valleys in detailed relief that stands up nearly a half inch. Engineers, consultants and technicians will find the up-to-date and authoritative world and 50-state U.S. maps useful, as well as decorative additions to the office, conference room or home. The detailed 50-state U.S. map shows 4,000 geographic names. It includes 2,000 cities and towns, 1,000 rivers and lakes, 150 national parks and monuments, and over 200 mountain ranges and peaks, and other features.

MINE CONVEYOR — Item 39

Hewitt-Robbins, Inc. has developed a new extensible mine conveyor which can operate as long as a week or more without being moved, thereby reducing the "down-time" associated with conventional conveyors which must be moved frequently to keep pace with continuous mining machinery, the manufacturer claims. The new unit is designed for use in underground coal and hard-rock mining. It is comprised of a belt which rides on idlers mounted on sled-like skids spaced at 5-foot intervals. The skids are held in alignment by wire ropes.

SWIVEL PILER — Item 40



When handling sand, grain or other granular, small lump bulk materials, the Swivel-Piler, developed by Stephens-Adamson Manufacturing Company engineers, increases conveyor storage range up to ten times, it is claimed. When mounted on the discharge end of a storage conveyor, the unit will throw material in any direction over an arc of 270°. This feature is said to eliminate frequent shifts of the storage conveyor system which saves time, equipment and money in materials handling operations.

This feature describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

These listings are informational and are not an endorsement of the products, nor of the manufacturer's claims.

thinking far up the road

One of these days you may be driving on an automatic highway, thanks to the years-ahead research of General Motors automotive engineers. GM's Auto-Control System, developed as an experiment in vehicle and traffic control, would provide exceptional comfort, convenience and safety for highway travelers.

A working model of the Auto-Control System, which is built into a miniature 20 x 30-foot oval track, demonstrates how electronics takes over steering, speed, braking and obstacle detection for highway vehicles.

Although the automatic highway is considered an approach to a problem rather than the ultimate solution, it clearly illustrates that automotive engineers and General Motors are not only looking to the future of automotive technology, but are really doing something about it.

GENERAL MOTORS

Congratulations to professional engineers, especially during National Engineers' Week.